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Executive Summary

Study Objectives and Scope

This study was commissioned by the City of Toronto to provide an objective assessment of certain issues relating to the operations of the Toronto Island Airport (the Island Airport). It provides a factual foundation on which the City can develop a position regarding the appropriate role for the airport.

The purpose of this study is to provide information on, and an assessment of four issues affecting the Island Airport. The issues, which define the scope of the study and were stated in the Terms of Reference for the study, are as follows:

1. What is the role of the Island Airport within the regional transportation system?
2. To what extent do the conditions of the Tripartite Lease Agreement constrain future airport development and increases in commuter air services? What additional constraints or caps can be added to the tripartite lease?
3. What are the impacts of various levels of airport development and commuter air service on the surrounding area, particularly adjacent parkland and residential communities?
4. What level of operation is necessary to make the Island Airport financially viable, today and in the future?

The study scope is limited to addressing these four issues. It is outside the scope of this study to provide recommendations to the City on future policy direction regarding the Island Airport.

Study Approach

Our overall approach to this study was to conduct comparative analyses of six alternative development scenarios for the Island Airport which highlight the four study issues. These analyses demonstrate the impacts of alternative roles the Island Airport could assume. The major elements of our approach include:

- The conduct of a literature review of relevant studies about the Island Airport and its operations.
- The conduct of interviews with over 30 individuals and agencies.
- The creation of the six development scenarios which were designed to highlight the four study issues.
- The analysis of the six scenarios over a horizon from 1992 to 2011 to quantify the relevant impacts.

Toronto Island Airport Today

The Island Airport currently operates as a combined General Aviation and commuter airport. The airport is governed by a Tripartite Lease Agreement (the Agreement) which is signed by the Corporation of the City of Toronto, the Toronto Harbour Commissioners (the THC) and Her Majesty the Queen (Transport Canada). The Agreement identifies certain restrictions on the Island Airport as discussed in more detail beginning on page 8 of this summary.

The General Aviation users at the Island Airport include corporate and private aircraft operators, a medevac service and Harbourair, a flying school which offers flight training. Commuter service is provided by Air Ontario to Ottawa, Montreal and London. From 1983 until recently, City Express also provided commuter service from the Island Airport, but the company ceased operations in February, 1991.

Access to the airport is provided by a ferry across the Western Channel which generally operates at 15-minute intervals. The ferry is capable of carrying up to 100 passengers, with up to six vehicles allowed per crossing.

The Island Airport's original passenger terminal building is located on the north side of the airport, directly adjacent to the ferry access point. The terminal building houses check-in counters, passenger waiting lounge, a secure boarding area, airline offices, and airport management and administration offices. A new "temporary" terminal building was completed in 1990, to the east of the old terminal building. It was constructed to provide relief for the old terminal, pending a decision on a "permanent" terminal building to replace the old terminal. City Express was the only airline operating out of the old terminal building until the airline ceased operations in February, 1991. Air Ontario operates out of a new terminal building on the Island.

The Island Airport has three runways, the longest of which is 4,000 feet which restricts its use to certain types of aircraft.

Over the past few years, Transport Canada has funded over $20 million in capital expenditures at the Island Airport. These improvements include:

- A new Air Traffic Control Tower.
- A microwave landing system.
- Groundside road improvements.
- Runway, taxiway, apron and ramp improvements.
- Improvements in gas, hydro, fresh water, storm water and sewer services.
- New fire main and hydrant system.
- A temporary customs building.
- New garage and maintenance building.

According to Transport Canada representatives, no further major capital expenditures which would be funded by Transport Canada are planned for the near future.

The Development Scenarios

The Island Airport currently operates as a combined General Aviation and commuter airport. This mode of operation is thought to be desirable as each segment contributes to the well-being of the airport and the aviation community in its own way. Further, Commuter and General Aviation aircraft are not necessarily incompatible at an airport. Therefore, all six development scenarios examined for this study entail a combined General Aviation and Commuter role.

The six scenarios selected for detailed analysis in this study are described below along the following dimensions:

- The rationale for each scenario.
- The assumptions concerning routes served by commuter airlines.
- The expected level of itinerant General Aviation activity. (For this report, itinerant General Aviation traffic is defined to be all traffic which does not provide a scheduled passenger service and which is not flight training activity).
- The assumed changes to the Agreement, if any.
- The priority given to the various types of air traffic once the maximum noise exposure limits are reached.

1. **Current Trends Scenario.** This scenario highlights the implications of no changes to the current operating strategy of the airport and a continuation of current market trends. In this scenario, air carriers are assumed to serve the same routes as at the end of 1990 (i.e., Montreal, Ottawa, London and Newark, New Jersey) with the Island Airport capturing the same market share of the Toronto Area air passenger traffic as it currently holds. Commuter passenger traffic is assumed to grow at approximately 4 percent per year, which is the forecast growth rate for air passenger traffic in the Toronto Area. Itinerant General Aviation movements are assumed to grow at Transport Canada's forecast average national growth rate of 1.4 percent per year. (One movement is recorded for each landing, take-off or simulated approach). Local movements (i.e., flying school activity) are restricted as noise exposure limits are reached.

2. **Increased Commuter Movements Scenario (without Jet Aircraft) and Unrestricted Itinerant General Aviation Scenario.** This scenario is designed to assess what might happen if the Island Airport were marketed to commuter carriers while still complying with the terms and conditions of the Agreement and not restricting itinerant General Aviation (even if higher commuter traffic levels could be reached). Essentially, the analysis of this scenario identifies at what point the Agreement constrains the airport from following this strategy. In this scenario, it is assumed that the number of scheduled flights on current and new routes will grow to accommodate the estimated potential demand for the Island Airport without expansion or until the maximum noise profile is reached. General Aviation traffic is assumed to grow at the same rate as in Scenario 1 and local movements are restricted as noise exposure limits are reached. If noise exposure limits are still exceeded once all the local traffic has been removed, commuter movements will be restricted so that itinerant General Aviation traffic is unrestricted. (In Scenario 4, this last assumption is reversed.).

3. **Increased Commuter Movements (with Jet Aircraft) and Unrestricted Itinerant General Aviation Scenario.** This scenario is designed to illuminate the effects of allowing commuter airlines to operate quiet jets at the Island Airport while still complying with all other terms and conditions of the Agreement. This scenario is an extension of Scenario 2 wherein scheduled commuter carriers are allowed to operate as "quiet jets" at the Island Airport.

4. **Increased Commuter Movements (without Jet Aircraft) and Restricted Itinerant General Aviation Scenario.** This scenario is designed to assess the impact of allowing commuter movements to grow unrestrained while restricting itinerant General Aviation traffic as noise

exposure limits are reached. In this scenario, commuter traffic is allowed to increase to accommodate the estimated potential demand for the Island Airport without expansion as in Scenario 2. However, if the maximum noise exposure profile constrains the commuter traffic activity in the future, then the itinerant General Aviation traffic is assumed to be limited to make room for further growth in commuter traffic (e.g., through operating restrictions).

5. **Break-even Itinerant General Aviation Scenario.** This scenario is designed to assess whether the Island Airport can achieve financial self-sufficiency while still complying with the conditions of the Agreement (for example, the maximum noise exposure profiles outlined in the Agreement). This scenario is an extension of Scenario 1. If the Island airport is not expected to be financially viable in Scenario 1, then the Airport is assumed to market its services successfully to the General aviation community in order to increase General Aviation traffic to the Airport to break even financially with no change in pricing strategy. Commuter activity is assumed to continue at the same level as in Scenario 1.

6. **Maximum General Aviation Scenario.** This scenario was examined to determine whether the airport could be financially viable as a General Aviation-only airport, assuming that no commuter traffic was permitted. Services and facilities at the Island Airport are assumed to be promoted to encourage the maximum possible itinerant General Aviation activity at the Island Airport while still complying with the terms and conditions of the Agreement. This scenario may be considered to represent the circumstances if Buttonville were to close. A sensitivity analysis was performed for this scenario in which we calculated the minimum commuter traffic which was required to use the Island Airport in addition to the higher level of General Aviation traffic in order to break even financially. We then tested this sensitivity to determine whether the maximum noise exposure limits were exceeded at that level of traffic.

In the conduct of the analyses it was found that Scenarios 4 and 5 above are redundant. Specifically:

- Scenario 2 was designed to highlight the impacts of marketing the Island Airport to commuter carriers. When the development scenarios were selected for study, it was uncertain when the noise exposure limits would be reached if itinerant General Aviation traffic were allowed to grow unconstrained as the commuter traffic grew. Therefore, a second scenario was selected, Scenario 4, which would highlight how severe the limits on itinerant General Aviation traffic would have to be to allow unconstrained growth of commuter traffic.

However, since the noise exposure limits were not exceeded (once local movements were restricted) and, consequently, no restrictions were required on either commuter or itinerant General Aviation traffic in Scenario 2, there was no need to analyze Scenario 4. That is, the analysis of Scenario 2 is the same as the analysis of Scenario 4.

- Scenario 1 was designed to highlight the impacts of allowing operations to continue according to general trends underlying current activity at the Island Airport. At the time the development scenarios were selected, it was uncertain whether the airport would be financially viable under Scenario 1. Therefore, a second scenario, Scenario 5, was selected which was designed to assess how much additional General Aviation traffic would be required above the levels forecast in Scenario 1 to make the airport financially viable. When the analysis of Scenario 1 showed that the airport was expected to be financially viable in all years without increased General Aviation activity, there was no need to continue with the analysis of Scenario 5.

Consequently, Scenarios 4 and 5 are not discussed in this report.

Study Results

The results of this study are presented below as answers to the four study issues.

1. WHAT IS THE ROLE OF THE ISLAND AIRPORT WITHIN THE REGIONAL TRANSPORTATION SYSTEM?

General Aviation Role

The Island Airport plays a significant role for General Aviation traffic in the Toronto Region. With 40,000 annual itinerant General Aviation movements in 1989, the Island Airport handled almost one-half as many itinerant General Aviation movements as Lester B. Pearson International Airport (Pearson) or Buttonville Airport.

Over the past two years, however, the Island Airport's importance in the General Aviation sector has declined. Despite severe restrictions imposed in late 1988 on the access of General Aviation aircraft to Pearson (which might have been expected to result in an increase of activity at the Island Airport), traffic at the Island Airport actually declined. Specifically, restrictions on access to Pearson caused itinerant General Aviation activity at Pearson to fall from about 95,000 annual movements to 83,000. General Aviation activity at the Island Airport for the same period decreased by

approximately 21,000 movements from 60,000 to 39,000. This decrease is generally believed to be due to a change in pricing strategy at the Island Airport.

Commuter Role

The Island Airport has served as a downtown airport for a total of up to 400,000 air passengers (including both business persons and tourists) visiting the City of Toronto as well as Toronto residents leaving the City for business or pleasure. The Island Airport provides a convenient alternative to Pearson for commuter air passengers living near or doing business in downtown Toronto.

Reliever Role

In considering the relief that the Island Airport provides to Pearson, two different scenarios were assessed:

- Pearson, given its current facilities and resources, is at capacity during peak periods and cannot handle more traffic at those times.
- Pearson adds to its current facilities so that it has sufficient capacity to handle more than its forecast peak period demand.

Pearson at Capacity

Transport Canada has limited the number of aircraft movements per hour at Pearson in response to the shortage of air traffic controllers at the airport. Even if this situation is not corrected in the long term, or if additional runways are not constructed to accommodate future growth, the Island Airport's ability to act as a "reliever" airport to Pearson is limited. Specifically:

- Much of the commuter traffic at Pearson carries passengers who are connecting to other flights in Toronto. These passengers cannot be easily diverted from Pearson to the Island Airport.
- Those commuter flights which carry mostly origin-destination traffic (i.e., passengers who are either beginning or ending their trip in Toronto) have generally already left Pearson, as shown by the recent proliferation of commuter flights at the Island Airport, Buttonville and Hamilton.
- Given the magnitude of the shift in traffic out of Pearson which resulted from the access restrictions there, it is likely that most of the General Aviation operators which could leave Pearson for either Buttonville or the Island Airport (e.g., any aircraft which could safely operate on a runway of 4,000 feet or less) did leave at that time. If General Aviation activity is further

restricted at Pearson, it is expected that the operators who are still there will either stay and put up with the tighter restrictions or potentially leave the Region altogether.

Consequently, the potential for the Island Airport to act as a reliever to Pearson is not significant.

Capacity Added to Pearson

If the air traffic controller shortage is remedied and the required runways are built, Pearson will need no relief until well into the next century. Even if the Island Airport were to close, Pearson would not experience significant increases in traffic (either in movements or passengers). Specifically:

- The processing of the approximately 400,000 annual passengers (which is approximately 2 percent of Pearson's passenger traffic) at the Island Airport is equivalent to only one-half year's growth in passenger traffic at Pearson.
- Commuter passengers would not necessarily be handled by more frequent commuter flights out of Pearson. Many would be absorbed by the current flights or by the addition of larger aircraft on certain routes.
- If the Island Airport were to close, some portion of the approximately 39,000 annual itinerant General Aviation movements at the Island Airport would likely move to Pearson. If Pearson were to handle its share of this traffic, it is estimated that Pearson would require additional runway capacity one or two years sooner than would otherwise be the case.

In summary, the relief provided to a non-capacity constrained Pearson by the Island Airport amounts to no more than the equivalent of one to two years' growth in traffic at Pearson.

2. TO WHAT EXTENT DO THE CONDITIONS OF THE TRIPARTITE LEASE AGREEMENT CONSTRAIN FUTURE AIRPORT DEVELOPMENT AND INCREASES IN COMMUTER AIR SERVICES? WHAT ADDITIONAL CONSTRAINTS OR CAPS CAN BE ADDED TO THE TRIPARTITE LEASE?

Constraints on Development

Under the Tripartite Lease Agreement, the growth of the Island Airport is limited through restrictions placed on:

- The **access to the airport** (i.e., the ban on a bridge or vehicular tunnel between the mainland and the Island Airport).
- The **types of aircraft** which can use the airport (i.e., the ban on jets and other noisy aircraft).
- The **development of the facilities** (i.e., the ban on the expansion of the Island Airport lands and on the extension of existing runways).
- The **total number and mix of aircraft** that can use the airport (i.e., the indirect control achieved through the noise restrictions).

The restrictions on access do not result in a physical limit on current activities at the airport and are not expected to limit growth in the long term. Based on a survey of ferry usage conducted as part of this study, we have estimated that the current ferry operations could adequately handle the equivalent of 1.1 million annual commuter passengers. Since the current level of activity is less than half that volume, the ferry capacity was found to be adequate for current operations. Based on the activity forecasts presented in this report, it was found that the current ferry would not be adequate at projected future levels of demand in two of the four scenarios. However, under the terms of the Agreement, the ferry may be replaced with a larger one if required. Therefore, this restriction does not present a physical limit on current activities at the airport and is not expected to limit growth in the long term under any of the development scenarios studied.

The current **restrictions on aircraft types** do limit activity in certain traffic segments at the Island Airport. Specifically, the terms of the Agreement restrict the use of the Island Airport by jet aircraft to those aircraft required for medevac flights and those involved in the Canadian National Exhibition Air Show. The Agreement also restricts the use of the Island Airport by aircraft which exceed defined noise criteria regardless of impacts on the overall airport noise profile. Accordingly, certain jet and non-jet aircraft are not permitted to use the Island Airport. It is expected that if these restrictions were lifted, activity in these traffic segments would increase.

The ban on the extension of the runways does restrict access to the Island Airport for many corporate aircraft which require a longer runway for safe operation. However, many of these aircraft are currently banned from using the Island Airport either because they are jet aircraft or because they are considered "noisy" aircraft. Unless the restrictions on these aircraft type are lifted, the ban on the extension of the runways is not considered to significantly limit current activities or to deter future growth in this traffic segment at the Island Airport.

The indirect restriction on the number and mix of aircraft through limits on the noise exposure in the surrounding area does limit the future growth potential of the Island Airport.

Additional Constraints

The Agreement employs a particular set of constraints which was considered appropriate during the execution of the document. However, additional constraints can be added to the Agreement, presumably only if agreed to by all signatories to the Agreement. It should be noted, however, that in the conduct of our research, no strong sentiments were expressed among the interviewees that the mechanisms used to control activity at the airport should be made more stringent; views were generally put forward that there is a greater need to ensure that the current standards are enforced.

The types of additional constraints that could be added to the Agreement are wide-ranging and include the following examples:

- A cap on the number of daily aircraft movements.
- A cap on the number of aircraft movements during a particular portion of each day (e.g., during evening hours, during early morning hours).
- A cap on different types of traffic (e.g., a cap for the maximum number of commuter movements and a different cap on the maximum number of General Aviation movements).
- A cap on the maximum number of passengers that can be processed at the airport.
- A limit on airport hours of operation.
- A tightening of the parameters used in the current NEF noise contour constraints in the Agreement.
- A tightening of the methodology used for developing NEF contours.
- The inclusion of additional noise constraints to the NEF contours employed in the Agreement.
- A limit on the availability of services and infrastructure at the airport (e.g., the number of available parking spaces).
- A limit on the alternative options to providing access to the airport (e.g., limiting the size of any replacement ferries).
- A restriction on airline maintenance operations during certain periods of the day (e.g., noisy maintenance activities during night hours).

If the above (and other possible constraints) are considered for inclusion in a revised Agreement, the parties should assess how well these additional constraints contribute to the achievement of the objectives of revising the Agreement. That is, for example, if an objective is to improve the safety of airport operations to the airport's neighbouring residents, then additional constraints dealing with the noise exposure of the residents may

not be the most appropriate means to accomplish that objective. A more direct means, such as limiting the number of movements of various types of aircraft during various times of the day, might be a more appropriate approach.

Each of these constraints would need to be considered in light of the relative difficulty of its implementation. Accordingly, some of the above (and other possible constraints) may not be worthy of consideration because of impractical implementation.

3. *WHAT ARE THE IMPACTS OF VARIOUS LEVELS OF AIRPORT DEVELOPMENT AND COMMUTER AIR SERVICE ON THE SURROUNDING AREA, PARTICULARLY ADJACENT PARKLAND AND RESIDENTIAL COMMUNITIES?*

Noise Levels

In general, all scenarios examined, with only one exception, resulted in noise contours which are within the limits specified by the Agreement if activity generated by the flying school located at the Island Airport is limited in later years. The scenario which analyzes the hypothetical introduction of jet service at the Island Airport is projected to result in a violation of the official noise limits much earlier than other commuter scenarios. In addition to limiting flying school activity, the jet movements themselves must also be restricted in that one scenario.

Our research and analysis provided several noteworthy results:

- The noise contour map attached to the Agreement was prepared in 1978, when the airport was used primarily for General Aviation. The maximum noise exposure contours were established on the basis of a traffic profile that differs significantly from the traffic profile of the Island Airport today. Hence the shapes of today's contours are different. The official contour is more round and extends closer to the shoreline and the residential developments there than the contour based on the forecast of the mix of traffic under Scenario 1 in 1992. The latter is a longer and narrower contour which extends further over the water.

- The contours of General Aviation activities are markedly different from those of de Havilland Dash 8 activity (the most popular commuter aircraft at the Island Airport). It follows that while the contour of Dash 8 only activity extends farther to the east and west than the General Aviation contour, it is narrower. Thus the noise impact along the shoreline and the residences on the islands could actually be lower if only Dash 8s were allowed to operate at the Island Airport than if only General Aviation aircraft were allowed, each

operating at the maximum level of activity allowed by the noise standards of the Agreement.

- Only three of the other eight airports researched as part of this study use explicit techniques for noise management. These are as follows:
  - St. Hubert Airport (near Montreal) uses NEFs to limit noise impacts.
  - Edmonton Municipal Airport uses a number of rules for this purpose, including a form of NEF contours.
  - John Wayne Airport in Orange County, California restricts the numbers and types of aircraft that can use the airport.

The findings of our study show that the Island Airport is well ahead of many other airports in North America in that standards on this issue have been established and are generally accepted by all interested parties.

Air Quality

None of the scenarios considered in this study would result in a significant degradation of local air quality (especially in the context of other sources of pollution in the area such as the Gardiner Expressway) with only one possible exception. The scenario in which "quiet jets" are allowed to use the Island Airport results in significantly higher emissions of nitrogen oxides than in other scenarios.

Road Traffic

The results of our study show that road traffic generated by the Island Airport is a relatively minor component of total road traffic in the vicinity of the airport. Assuming no increase in background levels of traffic, intersection and boundary roadway operations remain essentially unchanged. No intersection or roadway improvements are expected to be required to accommodate the increases in airport traffic associated with any one of the development scenarios.

Car Parking

Our analysis shows that demand for parking currently exceeds the supply of 124 paved parking spots adjacent to the ferry dock during the peak hours. However, overflow parking is accommodated in near-by lots. The Harbourfront Part II Plan policies and an agreement between the THC and the Harbourfront Development Corporation both allow for the construction of a parking facility with up to 400 spaces to replace the current parking lot. If such a parking facility were constructed, there would be sufficient parking

supply to accommodate the peak daily parking demand throughout the planning horizon in each scenario. If such a parking facility is not constructed, the shortage in supply may be addressed by changes in user behaviour such as:

- A shift in mode of transportation to the airport. For example, more commuter passengers may use the airline shuttle buses instead of brining their own vehicles.
- Greater use of other public parking facilities in the area.

Ferry Access

The current ferry is expected to be able to adequately handle the equivalent of 1.1 million annual commuter passengers. It is further expected that the existing ferry will need to be replaced in the medium term due to its age and state of repair. If the ferry is replaced with a larger ferry or supplemented with a pedestrian tunnel, it is expected that capacity will be adequate throughout the planning horizon in all development scenarios.

A key issue regarding the ferry replacement is how it will be financed. Although the Ministry of Transportation of Ontario provided the funding to purchase the last ferry, it is not certain if a capital subsidy will be available in the future for the replacement of the existing ferry. This potential future subsidy has not been quantified and is not included in our assessment of financial viability.

If and when the current ferry is replaced, there will be an opportunity to assess the relative merits of continuing ferry service and the construction of a pedestrian tunnel. Studies have shown that, although the capital costs of a pedestrian tunnel may exceed the cost of replacement ferries, the operating costs of a tunnel are likely to be significantly lower than the operating costs of ferry service. The net result may be that a pedestrian tunnel is the potentially low cost option in the long term.

Passenger Processing

The existing terminal building has been the object of much criticism as an inadequate passenger processing facility. A number of proposals have been made to move or remove the building to make way for a new terminal. However, this building has been recognized as an historical site and any proposals which might affect the existing terminal building must comply with the protections afforded the existing terminal building under the Agreement.

The combination of the existing terminal building and the "temporary" terminal does not provide adequate capacity to handle the level of commuter passenger traffic forecast in the development scenarios. For the purpose of this report, we have assumed that the

temporary terminal building will be enlarged or replaced as required for the scenarios in which additional facilities would be required.

Safety

Area residents and other interest parties expressed a concern that if traffic increases significantly from current levels, there will be a greater possibility that an accident might occur at the Island Airport. Residents have expressed concern about the safety of area residents and students and teachers at the Toronto Island Public and Natural Science School if activity is increased. Runway 15/33, for which the approach and departure paths go near the school, is used for about 5 percent of total itinerant movements.

There were also concerns raised in the conduct of the study about the effectiveness of ferry operations, particularly during bad weather, for air ambulance operations. The inability of ambulances to use the ferry to cross the Western Gap during bad weather prevents the ambulance from picking up an incoming patient as soon as the aircraft lands. In such cases, air ambulance flights generally use Buttonville or Pearson instead of the Island Airport.

Wildlife

The Island Airport lies on a migratory route for many songbirds, hawks and owls that follow the north shore of Lake Ontario. The heavy growth of trees and shrubs on the Island provides cover for the migrants. Any expansion of the Island Airport that would reduce this cover would be harmful to the migrating birds as well as to any local birds that rest in the area.

Further, birds in the vicinity of any airport may pose a threat to aircraft due to the possibility of a bird strike. A concern was raised during the conduct of the study that with increased aircraft activity at the Island Airport, (especially of the heavier aircraft used for commuter services) preventive action (i.e., reducing the bird population) would be taken to minimize the possibility of a bird strike. If jet aircraft were allowed to operate at the Island Airport, the possibility of bird strikes would take on more importance as a safety issue since birds can be "sucked into" a jet engine, causing damage to the engine.

Economic Impacts

An economic impact study commissioned by the Toronto Harbour Commissioners for the Island Airport was conducted in 1988 by Acres International Limited. This study concluded that the Island Airport plays an important role in the aviation system in

Southern Ontario as one of the busiest General Aviation airports in Canada. A significant benefit of the Island Airport is to travellers using the airport since it is closer to Toronto's central business district than either Pearson or Buttonville. Any savings of time and money to travellers who work in or need to commute to the downtown core (who are mostly business travellers) provide substantial benefit to the entire business community.

4. WHAT LEVEL OF OPERATION IS NECESSARY TO MAKE THE ISLAND AIRPORT FINANCIALLY VIABLE, TODAY AND IN THE FUTURE?

For the purposes of this report, the Island Airport is financially viable if it generates sufficient cash flow to meet annual operating obligations and to provide a reserve for future repairs and major capital expenditures required to maintain the existing capital assets over the long term.

The Terms of Reference for this study refer only to the Island Airport and do not explicitly include the ferry operations. Although the ferry operations are closely tied to the operations at the Island Airport, the operating and capital costs associated with access to the airport have been excluded from our financial analysis for the purpose of determining financial viability because the ferry is a separate business entity and therefore, outside of the scope of this study.

Similarly, since parking revenues, expenses and capital costs related to the operation of the existing parking facility are not included in the airport financial statements, these costs (present and future) were considered to be outside the scope of this study (for the purpose of assessing financial viability) and have not been included.

Three additional capital items have been excluded from the assessment of financial viability. Specifically, the following three items have been excluded for reasons discussed below:

- An expansion of the current or construction of a new terminal building. In the event that passenger traffic levels do increase substantially, it is expected that surplus funds (due in large part to the passenger user fee) will be generated from which such a project could be funded. If the passenger traffic levels do not increase substantially, there will be no requirement for this expenditure.
- Expenditures for Air Navigation Services and Air Traffic Services. It is expected that funds for these services will be provided by Transport Canada during the study horizon.
- Return on land and capital. None of the three parties (i.e., Transport Canada, the City or the THC) identified a requirement for a financial return on the land or past capital expenditures.

Historically, the Island Airport has operated at a loss. In all scenarios in which air carrier traffic is permitted to remain at the Island Airport, our financial analysis shows that the Island Airport can be financially viable starting in the first year (1992). The expected improvement in its financial position can be attributed to two factors:

- A forecast increase in the level of commuter traffic. Revenues from airlines in the form of landing fees and fuel surcharges contribute much more to total airport revenues than do similar revenues from General Aviation users.
- The imposition of a passenger user fee on the commuter airlines beginning in April, 1990. The Island Airport currently charges a passenger user fee of $3.00 per enplaned or deplaned passenger using the Island Airport. Based on a passenger forecast of about 500,000 enplaned and deplaned passengers at the Island Airport in 1992 under the first development scenario, this fee will generate an additional $1.5 million in 1992. Prior to the introduction of this fee in 1990, there were no revenues from this source.

In the one scenario where only General Aviation traffic is permitted to use the Island Airport, the airport is not projected to be financially viable at any traffic level examined. In other words, even if the level of General Aviation traffic at the Island Airport were to double, without revenues from commuter air carriers, the Island Airport could not be financially viable.

Proposals for building a high speed rail line between Windsor-Toronto-Ottawa-Montreal-Quebec City are currently under examination by an Ontario-Quebec Provincial Task Force. It has been suggested that such a service would divert substantial portions of automobile and air traffic to rail travel. The significance of a high speed rail service as a competitor to air travel is a function of the competitiveness of the rail fares relative to the existing air fares. In order to make rail service competitive, significant Government subsidies would be required. In spite of the potential social, economic and environmental benefits of a high speed rail service, it is uncertain, under the current economic climate, whether Governments would be willing to provide the required subsidies in order for the service to be established within the time horizon of this study. Consequently, the passenger and air traffic forecasts and the financial analyses conducted in this study do not take into consideration the potential impact of competition from a high speed rail service.

Summary

The results of our analyses for each of the four development scenarios are summarized in Exhibit 1 on the next page. In reviewing these results, it is important to remember that the scenarios studied were designed solely to provide answers to the study questions. They are analytic only and are not intended to represent realistic, reasonable or even

potential alternative development strategies. As such, no one scenario should be viewed as "better" than any other scenario.

1. Introduction

The Toronto Island Airport (the Island Airport) has been studied from various perspectives over the past decade and its future has been much debated. The report that follows presents a comprehensive, factual picture of the Island Airport today and analyzes alternative scenarios for its future development.

This chapter explains the purpose and scope of the report. It also explains how the study was conducted and how the remainder of the report is organized, to allow readers to gain the full benefit of the information presented in subsequent chapters.

1.1 Study Purpose and Scope

The purpose of the study is to provide information on, and an assessment of, four issues affecting the Island Airport. These issues are stated in the Terms of Reference, which are presented in Appendix A, as follows:

1. What is the role of the Island Airport within the regional transportation system?
2. To what extent do the conditions of the Tripartite Lease Agreement constrain future airport development and increases in commuter air services? What additional constraints or caps can be added to the tripartite lease?
3. What are the impacts of various levels of airport development and commuter air service on the surrounding area, particularly adjacent parkland and residential communities?
4. What level of operation is necessary to make the Island Airport financially viable, today and in the future?

The scope was refined during the study as a result of our findings and related discussions with the Steering Committee.

It was clear from the Terms of Reference that this study was intended to produce an objective and independent analysis of the four study issues and was not intended to present supporting or opposing arguments for any particular position regarding the airport. Thus, it is outside the scope of this study to provide recommendations to the City on future policy direction regarding the Island Airport.

1.2 Study Approach

Our approach to this study was to conduct comparative analyses of six alternative development scenarios for the Island Airport. These analyses are designed to assess the impacts associated with possible roles for the Island Airport. Our approach consisted of three stages:

- Start-up and Data Collection
- Detailed Research and Analysis
- Reporting

The approach used in each stage is explained below in general terms. Specific methodologies are described in detail in the report.

1.2.1 Start-up and Data Collection

Literature review. At the beginning of the study, we reviewed available background studies. This review provided a background on the issues related to the Airport and provided data for the analysis stage of our study. Subsequently, we were referred to other relevant studies which were also reviewed. The documents reviewed are listed in Appendix B.

Update of Toronto Region passenger forecast. Before beginning this study, we had already developed a sophisticated passenger forecasting model for air travel in the Toronto Region. We updated the results of this model in order to provide the context for the preliminary interviews and for use in the analysis stage.

Preliminary interviews. After completing the review of the background data, we concentrated on defining the scenarios which would be addressed. To arrive at the most appropriate definitions of those scenarios, we needed to be fully familiar with all the issues pertaining to the airport. Accordingly, we interviewed staff at the following agencies:

- The Toronto Harbour Commissioners
- Transport Canada
- The Federal/Provincial Committee on Toronto Area Airports
- Various provincial ministries
- Commercial airlines

and interviewed representatives of:

- Residents' and ratepayers' associations

- Other interested agencies.

A list of all parties interviewed is presented in Appendix C.

Scenario Development. Following the completion of the background research, we discussed our findings with the Steering Committee. From that discussion, six scenarios were identified for further analysis. The six scenarios were designed in order to fully address the study issues. The selected scenarios are specified in detail in Chapters 7 through 10.

Review of the Tripartite Lease Agreement. After developing detailed scenario descriptions, we met with the City Solicitor's Department to review certain legal interpretations of the Tripartite Lease Agreement (the "Agreement").

1.2.2 Detailed Research and Analysis

Having defined the six alternative scenarios, we undertook the detailed research and analysis needed to flesh out the scenarios so that the likely impacts of each alternative could be determined.

Detailed definition of each scenario and implications. Besides documenting each scenario at a much finer level, we analyzed the effects of different levels of demand on financial viability, the environment, access to/from the airport, and so on. This information was a prerequisite to the full analysis of the impacts of the scenarios and of the financial viability of the airport.

Impact analysis. The following impacts were quantified and analyzed for each scenario in considerable depth:

- Compliance with the maximum **noise levels** allowed under the Agreement,
- Compliance with Ministry of Environment **air quality** standards, and
- The requirement for and construction of certain **facilities** at the airport.

Direct research (e.g., surveys) was used as the key approach in the conduct of the impact analysis.

Financial Analysis. In analyzing financial viability, we developed a computerized financial model that projected cash flows for each scenario. This model was based on the 1990 budget for operations at the Island Airport. Projections of future cash flows were varied according to different assumptions about key inputs, such as demand forecasts (e.g., passenger counts, aircraft movements by type).

Research of similar municipal airport situations. We interviewed officials at other airports that face similar circumstances. This research was designed to compare the effectiveness of the Agreement with alternative methods of control at airports of similar size and/or airports and cities in similar situations. These are the surveyed airports:

- Boundary Bay, Vancouver
- St. Hubert, Montreal
- St. Andrews, Winnipeg
- Springbank, Calgary
- Edmonton Municipal Airport, Edmonton
- Meig's Airfield, Chicago, Illinois
- Burke Lakefront, Cleveland, Ohio
- John Wayne Airport, Orange County, California

A summary of the findings of this survey is presented in Appendix D.

1.2.3 Reporting

Several meetings were held with the Steering Committee during the study, and interim documentation describing the key decisions was supplied to the Committee.

A first draft report was submitted to the Steering Committee on November 26, 1990. Comments received at that meeting were incorporated into the final report. The final report has been prepared for presentation to City Council by City staff.

1.3 How this Report is Organized

Chapters 2 through 6, taken together, present the context in which the alternative scenarios for developing the Toronto Island Airport should be considered. Those chapters provide the facts and general analysis needed for the examination of the scenarios in a fully informed manner. Specifically:

- Chapter 2 presents a brief history of the Island Airport and a description of its current operations.
- Chapter 3 discusses the key terms of the Tripartite Lease Agreement which governs the Island Airport, the effects of the Agreement, and its shortcomings. The discussion in this Chapter assesses the extent to which the conditions of the Agreement constrain future airport development and increases in commuter air services.

- Chapter 4 provides a general discussion of the key factors that must be considered when the City is deciding on its position on the future of the Island Airport.
- Chapter 5 identifies the possible overall roles that could guide the development of the Toronto Island Airport.
- Chapter 6 addresses the issue of whether additional caps and constraints can be added to the Agreement.
- Chapter 7 provides a brief definition of the six development scenarios analyzed in this study and the methodologies used in the analysis of the various impacts. These scenarios have been developed as the basis for analyzing those study issues not directly addressed in previous chapters.

The last three chapters—8, 9 and 10—analyze the six alternative development scenarios in considerable depth. These chapters have been drafted on the assumption that the reader will have read Chapters 2 through 7 first. Accordingly, information presented in Chapters 2 through 7 is not repeated in Chapters 8, 9 and 10.

A number of technical terms are unavoidably used in the report. These terms are defined where they first occur and are also defined in the Glossary found in Appendix E.

2. Toronto Island Airport Today

This chapter presents background on the Island Airport and a description of its current operations:

- Its facilities,
- Its users (General Aviation and commuter traffic), and
- Its current roles in air transport, serving the Toronto Region and the City of Toronto.

Accordingly, this chapter provides the reader with an historical overview of operations and a factual picture of the Island Airport as it operates today. It is with that picture in mind that the information presented in subsequent chapters should be considered.

2.1 Background

2.1.1 Aviation at Toronto Island Airport, 1929 – 1953

In 1929, Toronto City Council approved the expenditure of $1 million for the first of two phases to construct a modern airport for seaplanes and amphibious aircraft[1] at the site of the current Island Airport. Exhibit 2-1 (on the following page) presents a map showing the location of the Island Airport. The construction project was later abandoned due to the Great Depression.

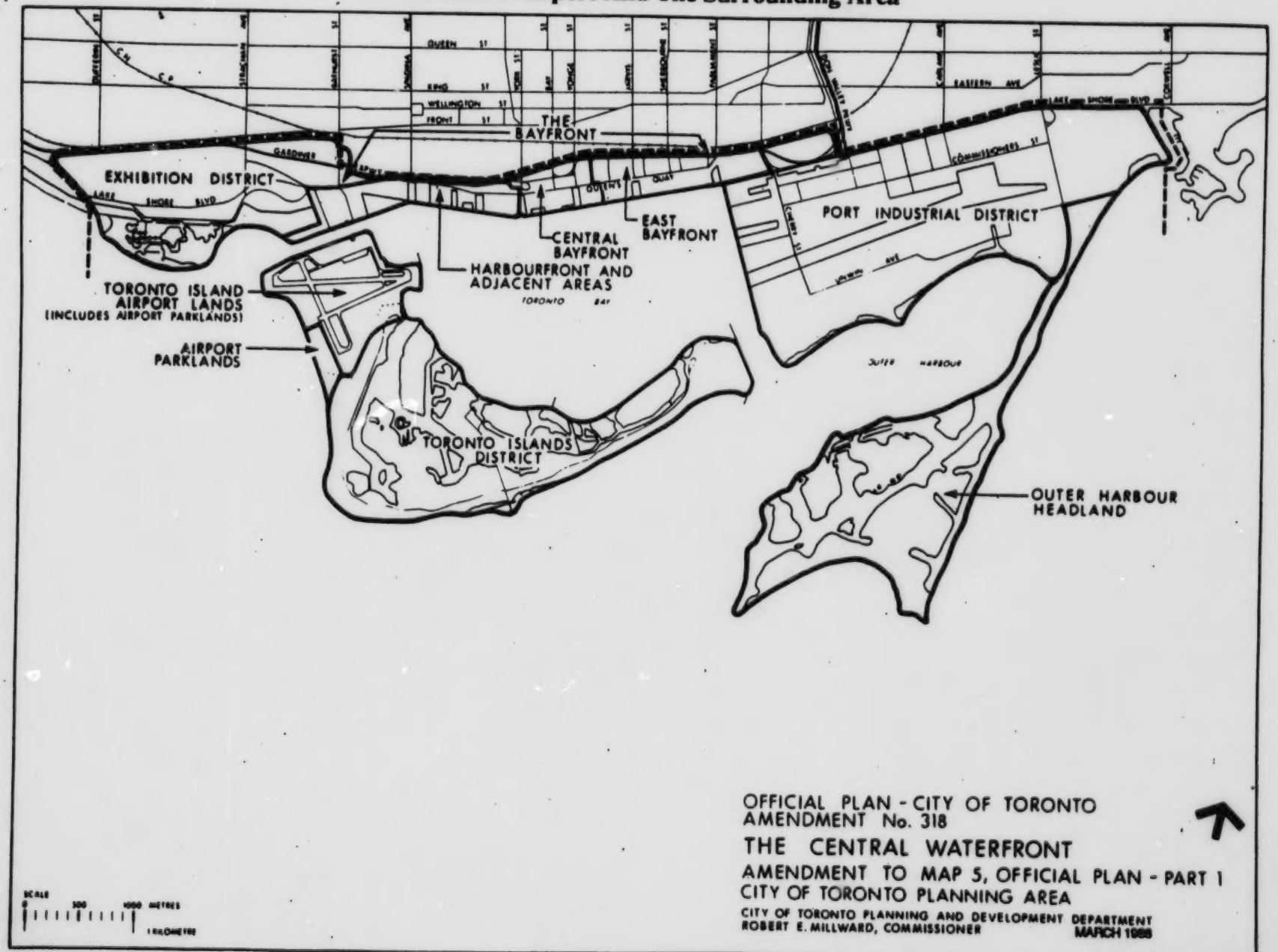
By the mid-1930s, the Government of Canada had established a program to ensure the maintenance of trans-continental landing fields. It provided financial assistance to major Canadian cities for airport development and directly assisted remote areas in developing emergency fields. In 1935, the Federal Government agreed to spend $1 million on the construction of a tunnel under the Western Gap to the island on which the Island Airport is located (the Island). However, the election of a new government in Ottawa curtailed the project after minor work had been completed.

A special committee was established by the City in 1936 to study Toronto's needs and the feasibility of creating an airport. Various sites were considered, including the Toronto

1 *Aircraft that can land on water or land.*

Exhibit 2-1

Toronto Island Airport And The Surrounding Area



Island and Malton. In 1937, the City decided to construct airports at both sites. The main Municipal Airport was to be built on the Toronto Island, and the Malton Airport, now known as the Lester B. Pearson International Airport, was to act as a backup facility in the event of fog.

The Toronto Harbour Commissioners (THC) managed the construction of and eventually operated both airports. The Federal Government agreed to lease the Malton airport land from the City of Toronto for about $1 per year and to assume all operating deficits. The Malton airport accepted major carriers while smaller aircraft tended to operate from the Municipal Airport. A cable ferry, put into service in 1939 by the THC, permitted access to the Island across the Western Gap.

During World War II, the Island Airport was used primarily as a training base for the Royal Norwegian Air Force and, later, for the Royal Canadian Air Force.

The post-war years saw the Island Airport used for training, light and private commercial aircraft, small aircraft charters, sight-seeing and aircraft rentals. Following substantial traffic growth, the Department of Transport opened its control tower in 1953.

2.1.2 Changes in Responsibilities

In 1957, the City received funding for improvements to the Island Airport in exchange for transferring ownership of Malton Airport to the Federal Department of Transport for $1. The funding of improvements at the Island Airport by the Federal Government included the construction of a new 4,000-foot runway and an aircraft hangar.

In the meantime, aviation activities continued to grow and in 1961, the Island Airport had the highest number of aircraft movements among all Canadian airports. (One aircraft movement is recorded for each landing, take-off, or simulated approach.)

Until 1962, the City had financial responsibility for the Island Airport, which was operating at a deficit, while the THC had operational responsibility. In 1962, the THC took on some financial responsibility for the Island Airport. Since then, the Island Airport has continued to operate at a deficit.

In 1974, the Federal Government agreed to provide financial help by subsidizing the airport's operating deficit on the condition that an intergovernmental agreement on the future of the airport be established. In that year, the Joint Committee/Toronto Island Airport was appointed, with representation from the Federal, Provincial, Metropolitan and City governments and from local community organizations.

Advisors to the Joint Committee looked at alternative ways to use the airport site and proposed a wide range of uses, including General Aviation only, General Aviation and

Dash 7 Short Take-off and Landing (STOL) service, and recreational use with or without housing. (STOL service as understood in the context of this study is explained in Section 2.3.2.) The federal, provincial and Metro governments favoured the General Aviation/STOL option; the City of Toronto wanted General Aviation only. As a result, no agreement was reached on future uses.

2.1.3 STOL Services on the Island Airport

During 1980 and 1981, the Canadian Transport Commission (CTC) held hearings on an application from a carrier to operate STOL services from the Island Airport to Montreal and Ottawa. The City of Toronto opposed the application on the grounds that it would detract from municipal efforts to promote waterfront recreation and housing and that the social cost of STOL service would exceed any benefits. The CTC, on the other hand, concluded that the STOL service was justified and that the travelling public needed a convenient service of this kind. Nevertheless, it did not award a licence because of the City's opposition to the STOL service and because Transport Canada had not committed itself to upgrading the Island Airport or to providing the infrastructure necessary for STOL services.

In 1981, Toronto City Council recommended that an agreement be negotiated with the Federal Government and the THC to develop the airport for General Aviation and limited commercial STOL service, with the provision that Council's waterfront objectives be upheld. In 1981, a Memorandum of Understanding (MOU) on this matter was signed by the Department of Transport, the City of Toronto, and the THC. The memorandum described the conditions under which a limited STOL passenger service could be established at the Island Airport. The CTC issued a licence to City Centre Airways to operate a commercial STOL service in August 1982.

2.1.4 The Tripartite Lease Agreement

A tripartite lease agreement (the Agreement) was entered into on June 30, 1983, by the Corporation of the City of Toronto, the Toronto Harbour Commissioners and Her Majesty the Queen. This Agreement superseded the MOU and covered the lease of certain lands to the THC for 50 years (July 1, 1983, to June 30, 2033). The Agreement imposed certain restrictions on the use of the Island Airport and set out the obligations of the three signing parties. In broad terms, the Agreement permitted the use of the Island Airport for General Aviation and limited STOL passenger service.

The Agreement is discussed in more detail in Chapter 3.

2.1.5 Recent Transport Canada Initiatives

Over the past few years, Transport Canada has funded over $20 million in capital expenditures at the Island Airport. These improvements include:

- A new Air Traffic Control tower.
- A microwave landing system.
- Groundside road improvements.
- Runway, taxiway, apron and ramp improvements.
- Improvements in gas, hydro, fresh water, storm water and sewer services.
- New fire main and hydrant system.
- A temporary customs building.
- New garage and maintenance building.

According to Transport Canada representatives, no further major capital expenditures by Transport Canada are planned for the near future.

2.1.6 Current Airport Users

The Island Airport is currently a General Aviation airport with limited commuter service provided by only one airline. The General Aviation users at the Island Airport include corporate and private aircraft operators, medevac service and Habourair, a flying school which offers flight training. Air Ontario, which is 50 percent owned by Air Canada, began operations at the Island Airport in April, 1990 and now provides scheduled service to Ottawa, Montreal, and London, Ontario. The airline operates out of the new "temporary" terminal building on the Island. City Express, which was the only commuter air carrier at the Island Airport until Air Ontario began operations, offered service to Ottawa, Montreal and Newark, New Jersey in 1990. However, due to financial difficulties, City Express's operations were sharply reduced in August, 1990 and the air carrier ceased operations completely in February, 1991.

2.1.7 The City's Need for a New Look at the Island Airport

In recent years, the Island Airport has received much publicity due to several developments, including the following:

- Funds available from Transport Canada to subsidize the operating deficit of the Island Airport are being reduced. In response, the THC has adopted measures

to stimulate airport revenues. Some of these initiatives have been opposed by interested parties.

- Recently, the THC proposed several improvements to the airport facility, such as a new terminal building. The new facility is intended to house additional scheduled airline services (such as Air Ontario, Canadian Partner, Simo Air). At the same time, the THC has authorized a set number of scheduled commuter airline movements per day at the airport for a one year trial period which ended April 1, 1991.

- An acute shortage of air traffic controllers in Ontario has caused Transport Canada to restrict operations at Lester B. Pearson International Airport (Pearson). This effective loss of capacity in Toronto has led to suggestions that the Island Airport could relieve congestion at Pearson if its role within the Toronto Region were expanded.

- Currently, no master plan for the area airports exists for the Toronto Region. The Federal Government has appointed an environmental assessment panel to undertake a public review of the environmental and socio-economic effects of Transport Canada's medium to long-term proposals to address the problem of air traffic congestion at Pearson and the lack of a master plan for the area airports. Uncertainty over the Federal Government's intentions towards Toronto Region airports has provoked speculation about the Island Airport's future.

The City of Toronto reacted to these developments by commissioning a study of the Island Airport to gain an objective assessment of the issues relating to the operations of the Island Airport. The study was intended to provide a factual foundation on which the City could develop a position regarding the appropriate role of the Island Airport. The City prepared terms of reference for the study, including a series of study tasks. The Terms of Reference are presented in Appendix A.

Peat Marwick Stevenson & Kellogg (PMS&K), in association with Marshall Macklin Monaghan (MMM) and CJB Associates Inc. (CJB), was selected in competition with other bidders to conduct the study. This report presents the findings of that study.

The study team reported to a Steering Committee made up of representatives of the City's Planning and Development Department, Public Works and the Environment Department, City Legal Department and City Property Department.

2.2 Facilities

The facilities at the Island Airport can be broadly classified as groundside and airside facilities. Groundside includes all facilities which are not directly related to aircraft operations such as:

- Ferry services.
- Car parking.
- The airport terminal building.
- The "temporary" terminal building.
- Fixed-base operators.
- Customs and immigration services.

Airside facilities include all facilities and services relating to the operation of aircraft such as:

- Runways, taxiways and aprons.
- Aircraft hangars.
- Emergency Rescue Services.
- Aircraft parking.
- Maintenance and garage buildings.
- Services and roads.
- Air traffic services.
- Landing and approach aids.

These facilities and services are discussed briefly below. Many of the facilities described in this section are shown in Exhibit 2-2.

The Island Airport is open from 6:30 a.m. to 11:30 p.m. daily and services are generally offered only during operating hours.

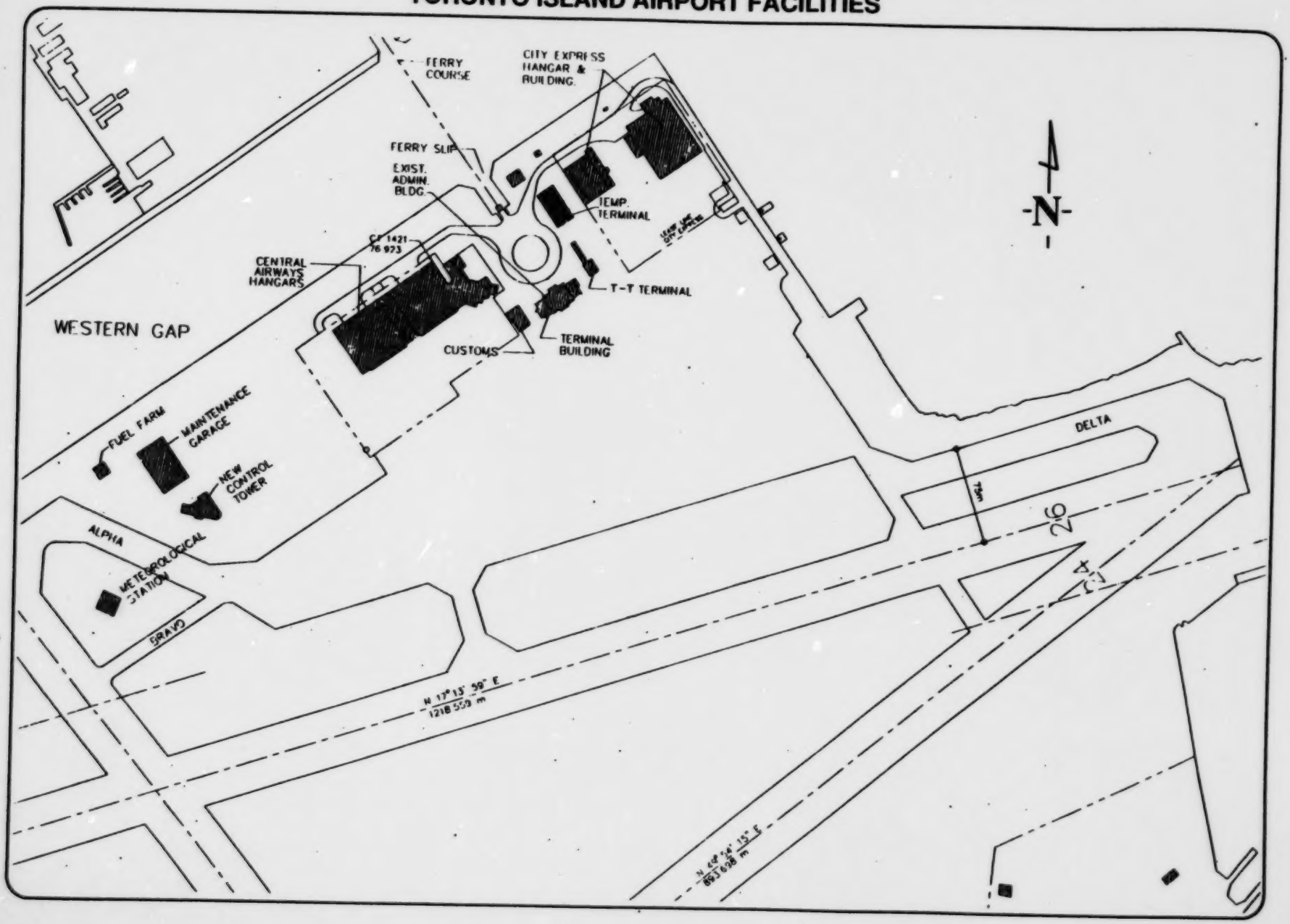
2.2.1 Access

Ferry Access

The Toronto Island Airport, as its name implies, is located on an island which is approximately 3 kilometres from the financial district of downtown Toronto. Access to the airport is provided by a ferry across the Western Channel which generally operates at 15-

Exhibit 2-2

TORONTO ISLAND AIRPORT FACILITIES



minute intervals (four round trips per hour, and five trips during peak periods). The ferry is capable of carrying up to 100 passengers, with up to six vehicles allowed per crossing. (Ferry capacity is discussed in more detail in Section 4.5.2.)

The ferry provides the main access to the Island and must accommodate emergency vehicles, maintenance and supply vehicles, airline buses, other air carrier passengers, general aviation users, staff vehicles, employees without cars, and fuel trucks. When fuel is being transported on the ferry, other vehicles and passengers are prohibited. Consequently, the transport of fuel is generally restricted to off peak hours.

In bad weather conditions, the ferry operates "off the wall" instead of from its slip. This means that the ferry is operated from a wall to the east of the slip on the mainland. In such a case, vehicles cannot board the ferry.

Car Parking

The Toronto Island Airport is served by a surface parking lot on the mainland which has an existing supply of 124 spaces, including monthly permit parking spaces. The parking lot is maintained and operated by the Parking Authority of Toronto on behalf of the Toronto Harbour Commissioners. The lot was recently relocated to a site immediately east of the ferry slip and is heavily used by passengers and airport employees. Limited spaces are provided on the Island for senior airport staff. Overflow parking is accommodated by privately-maintained and operated lots in the vicinity of the airport.

2.2.2 Passenger Processing

Airport Terminal Building

The airport's original passenger terminal building is located on the north side of the airport, directly adjacent to the ferry access point. A two-storey wood-frame building constructed in 1938, the building has been designated an historical structure by the Toronto Historical Board because of its unique architectural qualities and its historical significance in the development of the City of Toronto as a transportation centre. The building has also been recognized as a national historic site. This recognition may allow the building to qualify for federal funds for maintenance and renovation.

The terminal building houses check-in counters, a passenger waiting lounge, a security hold room, airline offices, and airport management and administration offices. City Express was the only airline operating out of the terminal building. It was often congested and lacks space for concessions. The building has been criticized by passengers and employees for not providing service levels to its airline tenant and its passengers which are appropriate for a significant transportation facility (e.g., only two public washrooms).

The terminal building has eight air carrier aircraft parking positions. If a 20-minute turnaround can be achieved for each aircraft during the peak hour, 24 aircraft can be handled in one hour. (Generally, a 30-minute turnaround is considered standard for planning purposes. However, in the peak hours, commuter aircraft can easily achieve a 20-minute turnaround.)

Temporary Terminal Building

A new "temporary" terminal building was completed in 1990, to the east of the old terminal building. It was constructed to provide relief for the old terminal, pending a decision on a "permanent" terminal building to replace the old terminal.

This building provides passenger processing and has 3 check-in counters with 2 positions at each counter, a waiting lounge, a security hold room and airline offices. The new building was designed to accommodate all three airlines (i.e., Air Ontario, Canadian Partner and Intair) which were granted landing rights at the Island Airport in the fall of 1989 to begin operations in 1990. However, two of those airlines did not begin operations leaving Air Ontario as the sole tenant. This terminal services the same eight aircraft positions as the existing terminal.

Fixed-Base Operators

The major fixed-base operator at the Island Airport, Central Airways/Avitat, provides a variety of services such as maintenance, ground handling, and restaurant facilities for both locally based and visiting users. They also rent office space to a variety of tenants.

Customs and Immigration Services

Canadian Customs and Immigration services are provided in a temporary building adjacent to the old terminal for passengers and cargo arriving from the U.S.A. These services are available during operating hours for airline and General Aviation traffic.

At Lester B. Pearson International Airport (Pearson) and at other international Canadian airports, air travellers leaving for the United States can clear U.S. Customs and Immigration prior to leaving Canada. This "preclearance" saves travellers the possibility of a delay clearing U.S. Customs and Immigration at their destination. Preclearance of U.S. Customs and Immigration is not available to air travellers leaving the Island Airport. The issue of preclearance is discussed in greater detail in Section 4.6.

2.2.3 Airside Facilities

The airside facilities are those used in the operation and maintenance of aircraft. The material in this section is technical and can be omitted without significant loss of continuity.

Runways

The Island Airport has three runways. Runway 08/26 is 4,000 feet long; runway 06/24 and runway 15/33 are each 3,000 feet long. Runway 08/26, which is used for approximately 80 percent of all aircraft movements at the Island Airport, is the favoured runway because it is the largest and is best aligned with the prevailing wind conditions. Runways 15/33 and 06/24 are used for about 5 percent and less than 1 percent of total movements respectively. The remaining 15 percent of movements consist of seaplanes and helicopter movements.

A maximum runway length of 4,000 feet restricts the use of the Island Airport to aircraft which can safely or legally take off within 4,000 feet.

Taxiways

Six taxiways provide access to the runways from the apron area. Runway 08/26 is accessed by taxiways A, B, C, D and F. Taxiway E connects Runway 15/33 with Runway 08/26.

Apron

The existing apron area, including a recent expansion of 350,000 square feet, covers an area of approximately 800,000 square feet. It provides access to the passenger terminal, hangar facilities, aircraft parking, and apron tie-down areas.

Seaplane Base

The landing area for seaplanes which wish to use facilities at the Island airport is to the east northeast of the Island. This base is the only seaplane base in the immediate area. The only other seaplane base on the Canadian side of Lake Ontario is in Hamilton Harbour.

The seaplane movements at the Island Airport for 1988 to 1990 are as follows:

1988	-	943
1989	-	835
1990	-	656

Hangars

The four hangars at the Island Airport are located north of the main runway. Hangar 1, built in 1938, has an area of 19,200 square feet and is under lease to City Express. Hangar 2, which dates from the same period, is in poor condition and is also under lease to City Express. Hangars 3 and 4, which are newer, each have a floor area of 17,500 square feet

and are leased to Central Airways. Central Airways also has a new office complex and passenger lounge located next to its hangar.

Emergency Rescue Services

The Emergency Rescue Services (ERS) provided at the Island Airport currently meet the Transport Canada staffing and equipment standards for a Category 5 airport. (Transport Canada has established standards for equipment and staffing levels based on the level and type of activity at an airport.) The firehall is open during airport hours.

Aircraft Parking

The Island Airport has three paved aircraft parking aprons. The largest, 720 feet long and 160 feet wide, is in front of the passenger terminal. It has just recently been extended about 100 feet to the south and is used by both General Aviation and commuter aircraft. The second apron forms part of the hangar 3 and 4 complex, while the third serves hangars 1 and 2.

Parking for airport-based aircraft and limited parking for aircraft not based at the airport is available on the apron. In total, the airport has 112 aircraft parking positions, of which 60 are regularly in use.

In addition, Central Airways has 30 paved parking spaces and space for up to 50 aircraft in their two hangars.

An asphalt helicopter pad is located adjacent to the control tower. A seaplane ramp is located at the eastern boundary of the Island Airport and has an adjacent paved area for seaplane storage.

Maintenance and Garage Building

Adjacent to the new Air Traffic Control Building (see below) is a new building, constructed in 1989, for garaging and servicing airport vehicles and equipment.

Services and Roads

In 1988, several major improvements to the services and roads were undertaken at a cost of almost $6 million. These improvements include such projects as:

- The installation of new water and gas distribution systems.
- The reconstruction and paving of the land-side road system.
- The installation of improved security fencing.

2.2.4 Air Navigation Facilities

Air Traffic Control Tower

The new ATC Tower, which houses the control cab and administrative space, was constructed by Transport Canada in 1988 at the northwest corner of the airport and provides air traffic services to aircraft on one ground frequency and three tower or "air" frequencies.

Instrument Approach

An instrument approach procedure is a procedure that allows pilots to establish positions on final approach in weather conditions that do not permit them to establish their position visually. The procedure explicitly defines the approach and departure paths for the aircraft to and from the airport and, if applicable, incorporates such requirements as avoiding noise sensitive areas.

There are three types of instrument approaches which can be broadly classed by the type of wavelength of the signal which is used for the approach aid:

- A non-directional beacon (NDB) generates a medium frequency (MF) signal from which the pilot can determine his position relative to the beacon. An NDB approach offers the lowest level of precision and, therefore, can only be used if the weather conditions are within prescribed conditions.
- An instrument landing system (ILS) generates very high frequency (VHF) signals which provide information to the pilot on the degree of descent and the aircraft's position relative to the centre of the runway. The ILS allows a safer approach in more severe weather than the NDB approach.
- A microwave landing system (MLS) is very similar to an ILS except that the signals are microwave signals, not VHF signals. The MLS permits safer approaches in even more severe weather than either an NDB or ILS approach.

Any one of the above approaches can be co-located with distance measuring equipment (DME) which provides the pilot with the aircraft's distance from the DME and allows the pilot to calculate the aircraft's distance from the airport.

Until recently, the Island Airport did not have a published instrument approach. An NDB/DME approach was actually used by airline pilots but only if their air carrier adopted the approach as a "company" approach. In December 1990, the Island Airport's NDB/DME approach was published in the *Canada Air Pilot*, a reference publication showing approaches for all licensed airports in Canada. This allows General Aviation aircraft to use the NDB approach. While the effects of the publication of this approach are

uncertain, it is unlikely that it will have a significant impact on the number of General Aviation movements at the Island Airport.

The published NDB approach to the Island Airport requires that the pilot head for the Gibraltar beacon (the NDB) at a minimum elevation of 3,100 feet above mean sea level (AMSL) unless a lower elevation is assigned by Air Traffic Control. (The elevation of Toronto Island Airport is 251 feet AMSL.) On passing over the NDB, the pilot proceeds in a southeasterly direction for the next 3 to 8 nautical miles (1 nautical mile is equal to approximately 2 kilometres), gradually reducing the aircraft's elevation to 1,500 feet AMSL. When the aircraft is at 1,500 feet AMSL, the pilot reverses direction and returns in a northerly direction, still reducing elevation, to once more pass over the NDB at a minimum altitude of 760 feet AMSL. These procedures take place over Lake Ontario, south of the shoreline of the Island. Once the pilot passes over the NDB heading the airport, the pilot should be able to see the ground and proceed directly to the airport by establishing the aircraft's position using landmarks on the ground (i.e., flying by visual flight rules).

Microwave Landing System

A dual Microwave Landing System (MLS) has been installed for runway 08/26, the airport's main runway. The MLS system allows aircraft to land and take off in worse weather conditions than permissible using an NDB approach. It also allows aircraft to achieve steeper approach and climb-out gradients as well as curved approaches which are not possible with either an NDB or ILS approach but which can potentially minimize noise impacts around the airport.

In theory, the curved and steep approaches will help the aircraft avoid obstacles and noise-sensitive areas adjacent to the published approaches. In practice, however, the recently commissioned MLS approach for the Island Airport does not take advantage of these features. This reflects the fact that the MLS was not installed at the Island Airport for the primary purpose of noise mitigation, but rather for safety reasons.

The cost of installing MLS equipment in existing aircraft is estimated to be between $50,000 and $100,000 per aircraft. Aircraft which will be manufactured in the mid-1990s are expected to have MLS equipment installed at the time of manufacture. Therefore, it is unlikely that the majority of General Aviation aircraft will be equipped to use the MLS within at least ten years. To date, the only aircraft regularly using the Island Airport and which are equipped to take advantage of the MLS approach are Air Ontario's Dash 8s.

MLS equipment will eventually become more common in General Aviation aircraft as the MLS replaces the ILS around the world as the standard instrument approach system. The International Civil Aviation Organization (ICAO), the Federal Aviation Administration (FAA) and Transport Canada are all committed to changing over to MLS by the year 2005. As a transition procedure, ILS will be co-located with any new MLS system until the

year 1995. (An ILS was not installed at the Island Airport due to interference in the radio signals caused by the presence of water so close to the end of the runway.)

2.3 Users

Island Airport users can be generally categorized by type of traffic as either General Aviation (GA) or commuter traffic. The distinctions between these categories are more easily appreciated if some general concepts about aircraft characteristics are understood. Thus, this section of the chapter outlines aircraft characteristics first.

2.3.1 Aircraft Characteristics

Aircraft can be classified in a number of ways such as:

- The type of propulsion
- The number of engines
- The size of the aircraft
- Any combination of the above.

Each of these classifications is discussed below.

Type of Propulsion

A **piston aircraft** has a piston engine or engines, much like the engine in an automobile, which cause a propeller or propellers to rotate, providing thrust for the aircraft. Piston engines are generally used in smaller aircraft and are generally quieter than the engines in larger aircraft. These aircraft are mostly used for recreational flying, for flight training, and for a variety of commercial purposes (e.g., air taxis).

A **turboprop aircraft** has a turbine engine which rotates a propeller, thus providing thrust for the aircraft. Aircraft with turboprop engines are generally larger and faster than the piston aircraft and therefore require the greater power provided by turboprop engines. Turboprop aircraft are generally (but not always) noisier than piston aircraft and are often used as commuter air carriers or corporate aircraft.

Jet aircraft have turbine engines which compress air and force it to leave the rear of the engine at great velocity, thus providing the thrust required for the aircraft to fly. Jet engines are used today in some commuter aircraft and most larger air carrier aircraft, as well as in some types of corporate aircraft. Jet aircraft are generally noisier than piston or turboprop aircraft, although the new generation of quiet jet engines may actually produce less noise.

It should be noted that aircraft noisiness is a function not only of the type of engine but also of the number of engines, their power and the altitude of the aircraft above ground. Further, although noise can be measured, perception of noise is ultimately subjective.

Number of Engines

Aircraft can also be classified by number of engines. Most single-engine aircraft have piston engines. Twin-engine aircraft can be either piston, turboprop or jet powered. Aircraft with more than two engines are generally powered by turboprop or jet engines.

Size of Aircraft

The gross take-off weight of an aircraft is the maximum allowable weight for which the aircraft is licensed to operate, including the aircraft's own weight, fuel and payload.

Light aircraft are defined as having a gross take-off weight of less than 5,670 kilograms (12,500 lbs). Light aircraft are single-engine or twin-engine aircraft, powered by piston engines.

Medium aircraft have a gross take-off weight between 5,670 kg and 136,000 kg (300,000 lbs). Most aircraft fall into this category, from light twin-engine turboprops to large jet aircraft which hold up to 250 people, such as the Airbus 300.

Heavy aircraft have a gross take-off weight of more than 136,000 kg. The aircraft types in this category are the half-dozen largest three or four-engine jet aircraft types, such as Boeing 747s, MacDonnell Douglas DC10s and Lockheed 1011s.

2.3.2 Commuter Traffic

Definition of Commuter Traffic

Definitions of commuter traffic vary, depending on the use of the term. A sample of definitions includes the following:

- In Transport Canada's statistics and forecasts, a commuter aircraft is generally defined as any aircraft with 75 seats or fewer, operating a public service in accordance with regular schedules or schedules announced well in advance. Consequently, since commuter traffic is carried by commuter aircraft, a definition of commuter traffic consistent with Transport Canada practices would be based on the above Transport Canada definition of commuter aircraft. The equivalent American definition of commuter aircraft differs only with respect to the number of seats (i.e., 60 seats or fewer).

- In the Agreement, a "limited commercial STOL service" is defined as "a service using Short Take-Off and Landing (STOL) aircraft, for hire or reward, in an operation duly licensed by the Air Transport Committee of the Canadian Transport Commission, and operating in a manner compatible with the specified capacity and capability of the airport facilities provided" and subject to a number of conditions on aircraft types and aircraft characteristics. (This definition may be considered to be the Agreement's proxy for a definition of commuter service).

For the purposes of classifying traffic at the Island Airport, commuter traffic is defined as the movements of all aircraft for the purpose of scheduled passenger transport. Since the de Havilland Dash 8 aircraft actually operates as a General Aviation aircraft under the terms of the Agreement and not as a STOL aircraft (see Section 3.3.2), but offers scheduled passenger transport, this definition is not entirely consistent with that in the Agreement.

Profile of the Airlines

From 1984 until 1989, City Express was the major air carrier with landing rights for commercial scheduled airline operations at the Island Airport. It has operated flights to Ottawa, Montreal, Quebec City, Hamilton, London, Detroit, Rochester, and Newark. During 1987, City Express's activity reached a peak in which it handled 400,000 passengers and generated approximately 40 movements per day. City Express no longer operates at the Island Airport since it ceased operations in February 1991.

On April 1, 1990, Air Ontario began scheduled operations from the Island Airport to Ottawa and Montreal. On October 15, it introduced more flights to Ottawa and began offering service to London, Ontario. As of October 15, Air Ontario offered 8 departures daily to Ottawa, 7 to Montreal and 6 to London, using Dash 8 aircraft.

Canadian Partner and Intair were also granted landing rights by the THC for scheduled flights at the Island Airport. However, neither airline exercised these rights before the rights expired on November 30, 1990.

The authorized number of commuter movements at the Island Airport has been set at 112 per day by the THC until April 1, 1991. This number was based on the existing schedule for City Express and the proposed schedules for Air Ontario, Canadian Partner, and Intair when the landing rights were granted in the fall of 1989.

Profile of the Aircraft

The relatively short runway and the ban on jet aircraft at the Island Airport have restricted the types of aircraft used for commuter traffic to a limited number. The most commonly used aircraft in 1989 was the de Havilland Dash 8, a twin-engine turboprop.

A STOL aircraft is a short take-off and landing aircraft. Such aircraft can take off and land using a very short runway, making them very suitable for operations at the Island Airport. In the Agreement, a STOL aircraft is defined as one that can maintain a 6-degree glide slope on approach or take-off. (A 3-degree glide slope is generally considered to be standard.)

The commuter aircraft used at the Island Airport generally seat 35 to 50 passengers and have a range of up to 1,600 kilometres. All are turboprop aircraft which suffer from a slower airspeed than jets of comparable size. For distances of less than about 800 kilometres, the time penalty associated with flying in a turboprop rather than a jet is not very significant (at most 30 minutes). However, for destinations over 800 kilometres, the additional flying time may be unacceptable to the flying public, making the turboprop uncompetitive.

Profile of Commuter Passengers

Based on the research conducted for this study, we have estimated that about 80 percent of the air passengers using the Island Airport are business travellers making day trips to or from Toronto. During the week, passengers at the Island Airport are almost exclusively business travellers. The remaining 20 percent of air travellers are visitors to Toronto who travel to visit friends or relatives, to sightsee, or to attend sports or cultural events, and Toronto residents leaving for Ottawa, Montreal or Newark for similar reasons. Most weekend users of the Island Airport are non-business travellers.

Historical passenger volumes at the Island Airport from 1983-1989 are shown in Exhibit 2-3.

Travellers use the Island Airport in preference to the much larger and diversified Pearson for any of the following reasons:

- Pearson is extremely congested, and flights are prone to delays. The Island Airport is much less busy, and aircraft operating from there are less likely to be delayed.
- The Island Airport is closer to downtown. The travel time to or from the Island Airport, from or to an office or hotel in the heart of Toronto is shorter than to Pearson at all times, especially during morning or evening rush hours. However, the travel time between the Island Airport and the homes of many air travellers may be longer than the time to/from Pearson. This is especially so during rush hours when people living in suburban neighbourhoods would, in the morning, have to fight their way through downtown traffic to the Island Airport just to fly out of town in the morning, and would, in the afternoon, have to fight the traffic out of the City in order to return home from the airport.
- The Island Airport is more easily reached by public transit than Pearson. Airline-supplied shuttle buses operate from check-in facilities at Union Station

Exhibit 2-3
Annual Passengers at Toronto Island Airport

Year	Number of Enplaned and Deplaned Passengers (000s)
1989	277
1988	330
1987	400
1986	270
1985	168
1984	120
1983	20

Source: Toronto Harbour Commissioners

which is well served by the TTC and GO Transit. Although public transit is available to Pearson from Islington, York Mills and Yorkdale subway stations and from some downtown hotels, these services are generally more expensive and involve a longer travel time than the service to the Island Airport.

2.3.3 General Aviation Traffic

General Aviation can be defined in varying ways, depending on the use of the term. Our definition below is followed by a profile of the Island Airport's General Aviation users.

Definition of General Aviation Traffic

The three definitions most relevant to this report are as follows:

- In Transport Canada's statistics and forecasts of aircraft movements, General Aviation, as distinct from Air Carrier traffic, is defined as the activity of operating an aircraft without a regular schedule, or without a schedule announced well in advance, or an aircraft chartered for the transport of passengers having a gross take-off weight of less than 5,670 kg (an "air taxi").
- In the Agreement, General Aviation is defined to include all aircraft which do not provide "limited commercial STOL service".
- Flight 32, the local chapter of the Canadian Owners' and Pilots' Association (COPA) which represents the Island Airport users, divides operations at the Island Airport into those aircraft which offer scheduled passenger transport (commuter) and those which do not (General Aviation).

In this report, we define General Aviation according to the third definition. It includes all training flights, recreational flying, medevac flights, corporate flights, charter flights and aircraft involved in the Canadian National Exhibition airshow.

Profile of General Aviation Users

Over the past ten years, the Island Airport has seen between 51,000 and 94,000 annual itinerant movements. An itinerant movement is a landing or take-off by an aircraft which arrives from or departs to another airport.

This activity has fallen off considerably in the last few years, as shown in Exhibit 2-4. In round numbers (to the nearest 100 movements), of the 51,000 itinerant movements at the Island Airport in 1989:

- 32,000 were by piston aircraft,
- 17,000 were by turboprop aircraft,

- 400 were by jets, and
- 1,600 were by helicopters or gliders.

The jet movements were primarily medevac flights and aircraft participating in the Canadian National Exhibition airshow. The historical movements by type of engine are shown in Exhibits 2-5 and 2-6.

The Island Airport also registered 48,000 local movements in 1989. (A local movement is a landing, take-off, or simulated movement by an aircraft which departs and arrives at the same airport without leaving its immediate vicinity.) This activity includes mainly flight-training aircraft practising take-offs and landings. As shown in Exhibit 2-4, local movements have also fallen off in the last few years due partly to the closing of the previous flying school at the Island Airport in 1989. However, another flying school has since started up at the airport.

The ban on jets at the Island Airport, as discussed in Chapter 3, together with the relatively short runway precludes some types of General Aviation aircraft from using the Island Airport. Most of the General Aviation users at the Island Airport other than medevac, are recreational users, corporate users and air taxis.

2.4 Current Role of the Island Airport in the Toronto Region

The term Toronto Region in this report includes the area from Hamilton in the west, to Newmarket in the north and Oshawa in the east. This area roughly corresponds to the population centre generally referred to as the Greater Toronto Area. The major airports in this area are:

- Pearson
- Toronto Island Airport
- Buttonville Airport
- Hamilton Airport
- Oshawa Civic Airport.

Certain airports within the Toronto Region are not discussed in this report. Downsview Airport, although comparable in size to Buttonville, is used by de Havilland and the military only, so it is not considered. Smaller airports include Brampton Airport, Burlington Airpark and Markham Airport. They are not discussed because they operate on a much smaller scale than the five airports listed above.

Exhibit 2-4
Annual Aircraft Movements at Toronto Island Airport

Year	Itinerant	Local	Total
1989	51,134	48,218	99,352
1988	73,744	88,060	161,804
1987	93,705	104,367	198,072
1986	81,980	100,305	182,285
1985	64,699	85,949	150,648
1984	60,749	90,163	150,912
1983	62,634	131,561	194,195
1982	65,766	142,240	208,006
1981	60,793	153,788	214,581
1980	51,229	144,175	195,404
1979	46,476	134,790	181,266
1978	49,000	143,679	192,679

Source: Aircraft Movement Statistics, Transport Canada Aviation Statistics Centre.

Exhibit 2-5
Annual Itinerant Aircraft Movements at Toronto Island Airport
(By Type of Propulsion)

Year	Piston	Turboprop	Jet	Other*	Total
1989	31,979	17,210	352	1,593	51,134
1988	50,461	21,383	364	1,536	73,744
1987	62,182	29,137	466	1,920	93,705
1986	59,715	17,505	412	4,348	81,980
1985	52,470	10,357	433	1,439	64,699
1984	52,678	6,380	342	1,349	60,749
1983	55,461	4,830	611	1,732	62,634
1982	58,001	5,137	561	2,067	65,766
1981	54,560	3,936	489	1,808	60,793
1980	46,635	2,608	338	1,648	51,229
1979	43,246	1,504	302	1,424	46,476
1978	44,511	1,837	231	2,421	49,000

Source: Aircraft Movement Statistics, Transport Canada Aviation Statistics Centre.

* *Helicopters and gliders.*

Exhibit 2-6
Itinerant Aircraft Movements at Toronto Island Airport
(By Type of Propulsion)
(%)

Year	Piston	Turboprop	Jet	Other*	Total
1989	62.5	33.7	0.7	3.1	100.0
1988	68.4	29.0	0.5	2.1	100.0
1987	66.4	31.1	0.5	2.0	100.0
1986	72.8	21.4	0.5	5.3	100.0
1985	81.1	16.0	0.7	2.2	100.0
1984	86.7	10.5	0.6	2.2	100.0
1983	88.5	7.7	1.0	2.8	100.0
1982	88.2	7.8	0.9	3.1	100.0
1981	89.7	6.5	0.8	3.0	100.0
1980	91.0	5.1	0.7	3.2	100.0
1979	93.1	3.2	0.6	3.1	100.0
1978	90.8	3.7	0.5	4.9	100.0

Source: Aircraft Movement Statistics, Transport Canada Aviation Statistics Centre.

* *Helicopters and gliders.*

2.4.1 Commuter Role in the Toronto Region

Lester B. Pearson International Airport (Pearson) is the major airport in the Toronto Region, currently handling over 21 million enplaned and deplaned passengers per year. It is among the world's top 20 airports measured by passenger traffic. The profile of these passengers is presented in Exhibit 2-7.

Since deregulation of the the airline industry in Canada in 1988, commuter traffic (defined as traffic to/from locations which can be considered to be in competition with potential services from the Island Airport and which are in compliance with the terms of the Agreement) has grown significantly primarily because commuter airlines offer more frequent service (on smaller aircraft) than offered by the major carriers. Specifically, commuter passenger traffic at Pearson in 1989 was estimated to be 1.6 million, approximately 8 percent of total enplaned and deplaned passengers.

The Island Airport is the second most important air carrier airport in the Toronto Region in terms of passenger traffic. In 1987, the Island Airport handled some 400,000 passengers on commuter aircraft. That number dropped to 277,000 in 1989. In 1990, the traffic could have been expected to exceed 400,000 if City Express's service had not been sharply reduced in the summer of 1990. However, this volume of traffic would still only be a small portion (some 2 percent) of the air passenger traffic generated within the Toronto Region.

2.4.2 General Aviation Role in the Toronto Region

In the General Aviation sector, the role of the Island Airport has historically been of much greater significance. With 40,000 annual itinerant General Aviation movements in 1989, the Island Airport handled almost one-half as many itinerant General Aviation movements as Pearson. The historical traffic of the Toronto Area Airports is shown in Exhibit 2-8. This information is also presented as market shares in Exhibit 2-9.

Over the past two years, the Island Airport's importance in the General Aviation sector has declined. For example, the flying school, which accounted for many of the 104,000 local movements in 1987, was closed in 1989—reportedly due to the high cost of doing business at the Island Airport relative to other General Aviation airports. However, in 1990, another flying school (Harbourair), which began operations from the Island Airport after the closure of the former flying school, was expected to generate approximately 60 percent of the number of local movements as the previous flying school.

In the Region as a whole, severe restrictions imposed in late 1988 on the access of General Aviation aircraft to Pearson reduced itinerant General Aviation activity at Pearson to about 83,000 movements in 1989 from 95,000 movements in 1988. Despite that reduction, itinerant General Aviation movements at the Island Airport did not increase. On the contrary: they decreased by approximately 35 percent from 1988 to 1989.

Exhibit 2-7
Profile of Air Passenger Traffic at Pearson

	Annual Passengers 1989 (Millions)	%
Originating and Terminating Passengers	16.8	80
Connecting Passengers	4.2	20
Total Enplaning and Deplaning Passengers	20.9	100
Toronto Region Residents	8.4	50
Visitors to Toronto	7.0	42
Non Toronto Region Residents travelling from Pearson (e.g., Kitchener residents)	1.4	8
Total Originating and Terminating Passengers	16.8	100

Source: Peat Marwick Stevenson & Kellogg.

Exhibit 2-8
Itinerant General Aviation Activity* at Toronto Area Airports

Year	Total Area	Pearson	Island Airport	Buttonville	Hamilton	Oshawa
1989	283,552	83,289	39,245	80,909	44,134	35,975
1988	308,408	94,885	60,308	70,024	45,168	38,023
1987	311,267	85,525	80,382	67,222	39,560	38,578
1986	284,925	78,613	71,706	62,972	35,927	35,707
1985	267,170	77,877	58,643	59,932	36,063	34,655
1984	263,585	70,823	59,770	60,917	37,061	35,014
1983	261,517	65,633	62,471	60,938	38,570	33,905
1982	268,232	63,358	65,608	60,208	46,782	32,276
1981	281,253	68,296	60,627	63,640	49,562	39,128
1980	299,216	76,477	51,102	68,500	60,248	42,889
1979	300,560	80,651	46,356	69,309	60,871	43,373
1978	301,666	82,241	48,881	67,663	59,754	43,127

Source: Aircraft Movement Statistics, Transport Canada Aviation Statistics Centre.

* *All aircraft movements by aircraft with a gross take-off weight of 9,000 kgs or less.*

Exhibit 2-9
Market Share of Itinerant General Aviation Activity* at Toronto Area Airports (%)

Year	Total Area	Pearson	Island Airport	Buttonville	Hamilton	Oshawa
1989	100.0	29.4	13.8	28.5	15.6	12.7
1988	100.0	30.8	19.6	22.7	14.6	12.3
1987	100.0	27.5	25.8	21.6	12.7	12.4
1986	100.0	27.6	25.2	22.1	12.6	12.5
1985	100.0	29.1	21.9	22.4	13.5	13.0
1984	100.0	26.9	22.7	23.1	14.1	13.3
1983	100.0	25.1	23.9	23.3	14.7	13.0
1982	100.0	23.6	24.5	22.4	17.4	12.0
1981	100.0	24.3	21.6	22.6	17.6	13.9
1980	100.0	25.6	17.1	22.9	20.1	14.3
1979	100.0	26.8	15.4	23.1	20.3	14.4
1978	100.0	27.3	16.2	22.4	19.8	14.3

Source: Aircraft Movement Statistics, Transport Canada Aviation Statistics Centre.

* *All aircraft movements by aircraft with a gross take-off weight of 9,000 kgs or less.*

The only area airport that picked up some of Pearson's and the Island Airport's traffic in 1989 was Buttonville. However, the increase of movements at Buttonville was far less than the decline at the other airports, indicating that some 10 percent of the itinerant General Aviation movements recorded in 1987 in the Toronto Region, as defined for the purposes of this report, simply disappeared from the Region by 1989.

2.5 Current Role of the Island Airport in the City of Toronto

Each year, the Island Airport has served as a downtown airport for a total of up to 400,000 air passengers (including both business persons and tourists) visiting the City as well as Toronto resident business persons and residents leaving the City on business or pleasure. Its purpose is to provide a convenient alternative to but not an emergency relief for Pearson. The Island Airport also serves as a General Aviation airport for up to one quarter of the Region's General Aviation users.

3. Tripartite Lease Agreement

A tripartite lease agreement (the "Agreement") was entered into on June 30, 1983, by The Corporation of the City of Toronto, the Toronto Harbour Commissioners, and Her Majesty the Queen. The Agreement replaced previous agreements among these parties and has been amended once (July 19, 1985). It covers the lease of certain lands to the THC for 50 years (July 1, 1983, to June 30, 2033).

This chapter describes the key terms of the Agreement and their general effects on the Toronto Island Airport. The provisions of the Agreement regarding noise are discussed in more detail in Chapter 4.

The development scenarios presented in Chapters 7 through 10 were developed in conformity with the Agreement with only one exception. In one scenario, "quiet" jet aircraft are assumed to be permitted to use the Island Airport in order to analyze the impacts of permitting such a change.

3.1 Key Terms of the Agreement

Under the Agreement, the THC "...shall have the right and obligation to administer, control, maintain, manage and operate the Island Airport as a public airport" and is to do so "in an efficient and business-like manner so as to ensure the most effective operation thereof that is consistent with good management aimed at meeting the overall objective of cost recovery", subject to a set of constraints. These constraints are listed below.

The THC shall :

- Not construct new or extend existing runways,
- Not construct a bridge or vehicular tunnel between the mainland and the Island Airport,
- Not expand the Airport lands,
- Not permit jet-powered aircraft to use the airport (with special exceptions),
- Not permit aircraft which generate excessive noise to use the airport, and shall
- Regulate the level of activity so that defined noise levels are not exceeded.

3.2 Effects of the Agreement on Financial Viability

Since 1983, the THC has reported an operating deficit for both the airport and the ferry. Under the Agreement, the airport deficit is subsidized by Transport Canada so long as it was authorized in a budget approved by Transport Canada. Budgets that are consistent with maintaining Transport Canada standards of operation have generally been approved. However, the Minister of Transport indicated in a statement in September, 1990 that he intended to work together with the airports to eliminate such subsidies. The ferry operations are subsidized by the Ministry of Transportation of Ontario.

Since the Island Airport operations are, in general, subsidized by the Federal Government, the effect of the Agreement is that the Island Airport is intended to be financially viable from the perspective of the other two parties to the Agreement, namely, the THC and the City. In recent years, however, the THC has incurred certain expenses to provide services that were not approved and, therefore, not subsidized by Transport Canada. For example, based on the level of activity at the Island Airport, Transport Canada standards do not include the staffing of the airport with a duty manager during normal operating hours. The THC and airport management feel a supervisory presence is required for safety reasons and have chosen to provide a duty manager during the evening and on weekends when senior airport management is not on site. This expenditure, which was not approved by Transport Canada, is funded by the THC.

For the purposes of this report, the Island Airport is defined to be financially viable only if it generates sufficient cash flow to meet annual operating obligations and to provide a reserve for future repairs and major capital expenditures required to maintain the existing capital assets over the long term. The definition is discussed further in Section 4.12.1.

3.3 Effects of the Agreement on Growth

Under the Agreement, the growth of the Island Airport is limited through restrictions placed on:

- The **access to the airport** (i.e., the ban on a bridge or vehicular tunnel between the mainland and the Island Airport).
- The **types of aircraft** which can use the airport (i.e., the ban on jets and piston or turboprop aircraft which are considered noisy).
- The **development of the facilities** (i.e., the ban on the expansion of the Island Airport lands and on the extension of existing runways).
- The **total number and mix of aircraft** that can use the airport (i.e., the indirect control achieved through the noise contour restrictions).

The **effectiveness** of these restrictions in limiting growth can only be measured against the objectives of the parties who agreed to these limits. However, it is possible to consider the general **effects** of the Agreement on growth, i.e., whether growth is deterred or limited, regardless of the intent of the Agreement. In this section, we look at each of the four types of restrictions and assess whether they function as a current deterrent to activity, or a potential limitation on growth.

3.3.1 Restrictions on Access

The Island Airport is currently served by a ferry across the Western Gap. As discussed later in this report, the capacity of the ferry is greater than the current peak-hour demand for access to the Island Airport. Further, although a vehicular tunnel or bridge is not permitted under the terms of the Agreement, the Agreement does not preclude replacing the ferry with a larger ferry if required due to obsolescence or to add capacity.

Therefore, this restriction does not present a physical limit on current activities at the airport and is not expected to limit growth in the long term under the development scenarios studied. However, City Express management believed that the presence of the ferry acts as a deterrent on passenger use of the Island Airport (particularly in poor weather) and thus, the airline further believed that even though the Agreement's restriction does not impose a physical limit on activity at the Airport, the ferry does negatively affect the Airport's share of the Toronto air traveller market.

3.3.2 Restrictions on the Type of Aircraft

The ban on jet aircraft prevents corporate jet aircraft from using the Island Airport. Given the downtown location of the airport, it is probable that more corporate aircraft would use this airport if jets were allowed. However, many aircraft in that category require a runway longer than the 4,000-foot runway currently available, because of the aircraft's performance specifications, the company's insurance policy, or the pilot's preference. The ban on jets together with the ban on the extension of the runways has prevented the use of the Island Airport by this category of user.

The Agreement also restricts the use of the Island Airport by aircraft considered noisy regardless of impacts on the noise profile. (The noise profile is discussed in Section 4.1.) When the Agreement was signed, the noise guidelines were based in part on the noise specifications of the de Havilland Dash 7. At the time, that aircraft was thought to be the best choice for commuter services at the Island Airport.

By 1985, the Dash 8 was expected to eventually replace the Dash 7. However, the twin-engine Dash 8 is slightly louder than its four-engine sister, the Dash 7. Accordingly, an amendment to the Agreement in 1985 (the Amendment) stated that the Dash 8 can be used

at the Island Airport if it is operated at reduced revolutions per minute (RPMs). Since the Dash 8 has not been officially designated as a STOL aircraft, it operates as a General Aviation aircraft under the definition of General Aviation in the Agreement. Transport Canada has assured the City in a letter dated April 28, 1986 that it believes the Dash 8s are being operated at the Island Airport in accordance with the terms of the Amendment.

In summary, the Agreement has prevented the use of the Island Airport by certain aircraft types. Further, although the 1985 Amendment allows aircraft which were previously prohibited aircraft to use the Island Airport, it was designed to minimize any reduction in the protection afforded by the restriction on allowable aircraft types.

3.3.3 Restrictions on Facilities Development

In this report, we refer to the ban on the expansion of the Island Airport lands and on the extension of the existing runways as the ban on facilities development.

The expansion of the Island Airport lands (with the exception of the land required to extend either runway) did not emerge as a major issue during our interview process. Although members of the General Aviation community have suggested that parking for General Aviation aircraft is in short supply, the Island Airport management has introduced strategies to manage the supply of facilities (e.g., paving a larger area in front of the terminal building, providing aircraft parking on the south side of the Island, and adjusting prices to reflect the value of the available lands more accurately).

For the types of aircraft currently permitted to operate at the Island Airport, the runway length of 4,000 feet for the longer runway (Runway 08/26) is adequate. Therefore, the ban on extending the existing runways does not currently limit traffic at the airport.

Many corporate business jets require that the runway be longer than 4,000 feet for safe operation. However, these aircraft are currently banned from using the Island Airport and, thus the ban on extending the runway would only be considered a limit to use by these aircraft if the ban on jet aircraft were removed.

In order to accommodate the next category of passenger aircraft (e.g., a McDonnell Douglas DC9 or a Boeing 737 which hold up to 125 to 130 passengers), the runway would have to be extended to at least 6,000 feet.

3.3.4 Restrictions on the Number and Mix of Aircraft

The overall level of activity at the Island Airport is controlled through the use of Noise Exposure Forecast contours (NEF contours, explained in Section 4.1.1). The Agreement does not include restrictions on the total number of flights in any one day.

The maximum noise contour was violated in 1987. This information was published by Air Navigation Planning, Air Navigation System Requirements Branch, Transport Canada, Ontario Region, in *Toronto Island Airport, 1987 Actual Noise Exposure Forecast, Input Data Report*, dated May, 1988. In that report, Transport Canada concluded that "the violation of the Toronto Island Lease Agreement is minor and over water". Transport Canada also suggested that the change in traffic mix at the Island Airport between 1987 (the time of the violation) and 1988 (the date of the report) may have resulted in a smaller noise contour and, consequently, no corrective action was taken by the Island Airport management. As expected by Transport Canada, results for 1988 did show that the 1988 noise contours were once again in compliance with the Agreement.

It follows that the current method of monitoring compliance with the Agreement may allow temporary violations due to both the "after the fact" nature of the analysis and the time required to conduct the analysis. However, over the longer term, the method should ensure compliance with the objectives of the Agreement in practical terms.

As discussed in detail in Chapters 8 through 10, the restriction on the number and mix of aircraft indirectly through noise constraints can be expected to limit future traffic growth at the Island Airport.

4. Factors Affecting the Choice of a Role for the Island Airport

The following are the key factors that must be considered when the City is deciding on its position on the future of the Island Airport:

- Environmental impacts, especially noise and air quality.
- Traffic, parking and access impacts.
- Safety.
- Wildlife.
- Economic impacts.
- Other environmental issues.
- Quality of life.
- Financial viability.

These factors are discussed in this chapter. Each of these factors varies with the six development scenarios defined in the study and is evaluated in Chapters 8 through 10.

4.1 Noise Impacts

The Agreement specifies two methods for monitoring and controlling the noise exposure at the Island Airport. The first is through the ban on the use of the Island Airport by any aircraft for which the noise specifications exceed the maximum noise specifications as defined in the Agreement, as discussed in Section 3.3.2. Such a restriction is well understood and can be relatively easily monitored and controlled. The second method, the use of Noise Exposure Forecasts (NEFs), establishes a standard for defining the boundaries of tolerable noise over a period of time. This second method is more complicated and less well understood. These two methods are used together in an effort to ensure that neither a single aircraft movement nor the aggregate effect of the total daily traffic exposes area residents to unacceptable noise levels.

Since the first method is relatively straightforward, this section concentrates on outlining the issues surrounding the use of NEF contours as a means of controlling the noise exposure at the Island Airport. Specifically, we explain what NEFs are and how they are used. We also describe some of the criticisms raised against the NEFs as a measure of

noise impacts. Finally, we described standard approach paths and how they affect noise levels at the Island Airport.

4.1.1 NEF Contours

Noise Exposure Forecasts (NEFs) are a means of measuring the impact of aircraft noise in the vicinity of an airport. Forecasts of noise impacts are based on the theory that the "irritation" caused to those within earshot of one aircraft movement varies with the sound energy emitted by the aircraft and the time of day at which the aircraft is operating. The NEF is a measure of the daily cumulative effect of all aircraft movements averaged over a defined period of time.

The forecasts make use of mapped contours called **NEF contours or noise contours,** which delineate the geographical boundaries of areas within which the NEF exceeds a certain level. For example, the "28 NEF" contour defines the area within which the cumulative effects of aircraft noise result in a volume of 28 on the NEF scale. Psychological studies carried out in the 1960's indicated that while NEF values below 25 are generally perceived as being similar in nature to exposure to other common types of background noise, some people may perceive values above 28 to be disruptive to certain activities. The degree of disruption increases with increasing NEFs and so does the percentage of people who are annoyed by the noise. If a location has an NEF of 40, it is probably no longer suitable for residential or recreational use, but may still be suitable for industries that often have greater noise levels generated by their own activities.

Transport Canada issues a publication which presents likely community responses to varying NEF levels, which is repeated in Exhibit 4-1.

The contours appear as a series of concentric rings, as shown on the map in Exhibit 4-2. The noise impact is generally greatest under the flight path into and out of the airport and on both sides of the runways. Consequently, the ring defining the highest noise impact will cover the smallest geographical area and will be closest to the airport. Each successive ring will be larger and will define an area with a lower noise impact.

4.1.2 Official NEF Contours and Actual NEF Contours

NEF contours can be drawn to create official standards with which airports must comply. In 1978, NEF contours were drawn to create maximum permissible noise standards in the vicinity of the Island Airport. These contours are referred to as "official NEF contours." They were drawn in 1978 to represent forecasts for 1990 and were based on 1978 traffic patterns extrapolated to 1990. They are the standards set by the parties to the Agreement that must not be exceeded by actual noise exposures.

Exhibit 4-1
Community Response Prediction

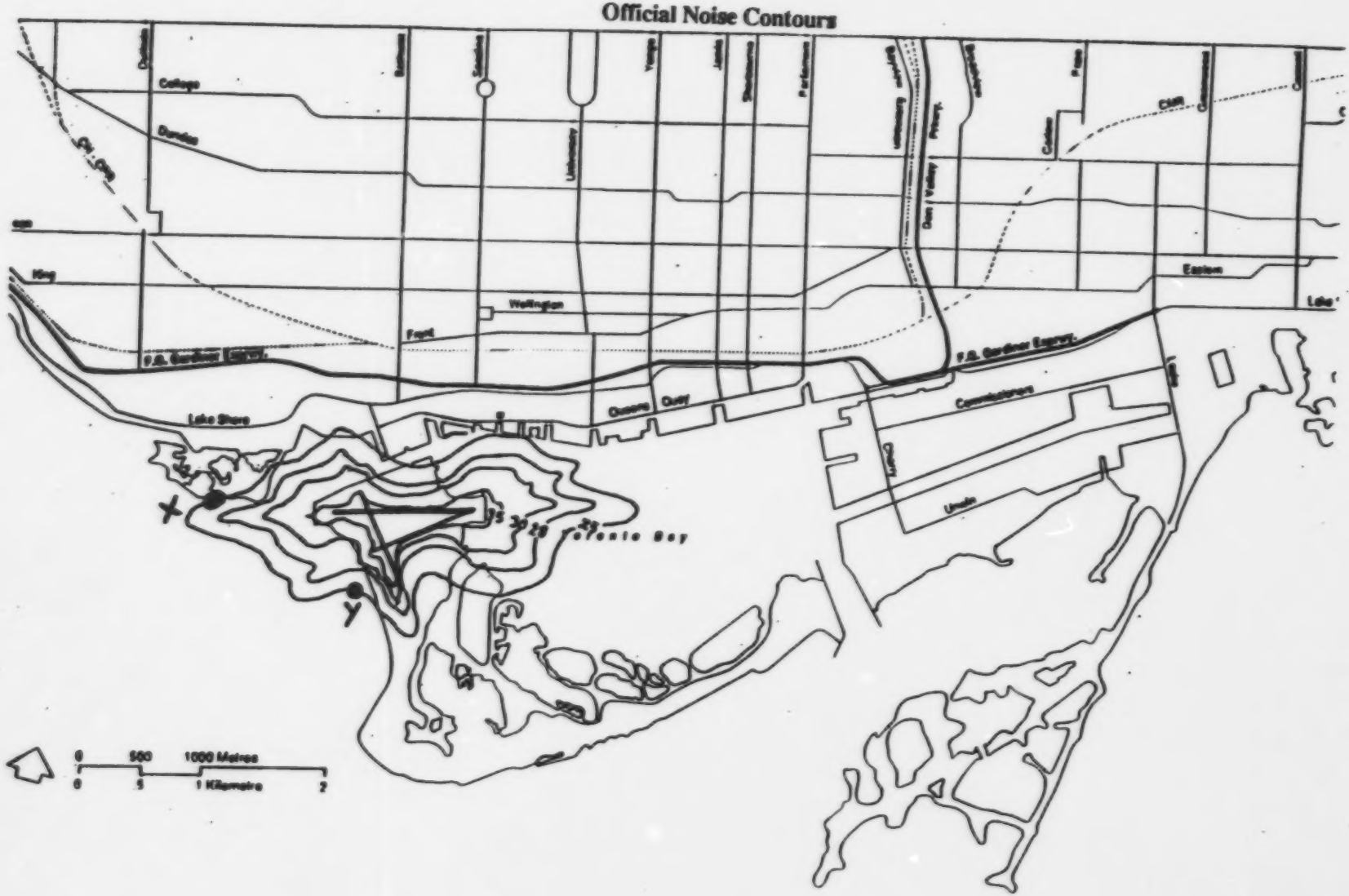
	Response Area	Response Prediction*
1	(over 40 NEF)	Repeated and vigorous individual complaints are likely. Concerted group and legal action might be expected.
2	(35-40 NEF)	Individual complaints may be vigorous. Possible group action and appeals to authorities.
3	(30-35 NEF)	Sporadic to repeated individual complaints. Group action is possible.
4	(below 30 NEF)	Sporadic complaints may occur. Noise may interfere occasionally with certain activities of the resident.

* *It should be noted that the above community response predictions are generalizations based upon experience resulting from the evolutionary development of various noise exposure units used by other countries. For specific locations, the above response areas may vary somewhat in accordance with existing ambient or background noise levels and prevailing social, economic and political conditions.*

(Source: Land Use in the Vicinity of Airports, Seventh Edition, March 1989, Transport Canada)

Exhibit 4-2

Official Noise Contours



TRIPARTITE LEASE AGREEMENT

NEF CONTOURS 1978

NEF contours can also be drawn using **actual** data on aircraft movements to produce what are called "actual NEF contours." Actual NEF contours are not based on direct measurements of the actual noise made by all aircraft over a particular area. Instead, they are **retrospective estimates** of the noise exposures over a particular area, given known facts about the movements of aircraft, their types, the time of day that the movements took place, and so on, over a defined period of time.

Actual NEF contours can be compared to the official NEF contours to find out whether the maximum permissible noise annoyance levels have been exceeded.

4.1.3 Drawing of the NEF Contours

Transport Canada has developed software that produces actual NEF contours. This software simulates the actual noise exposure using a database that profiles the aircraft movements at the Island Airport. The database comprises actual or forecast aircraft movements for the observation period. The following data must be included for each movement:

- Aircraft characteristics, including the type of engine, the number of engines, and mode of operation
- The runway used
- Whether the movement occurred during the day or night
- Whether the movement was a take-off or a landing.

The software assigns a "noise impact" to each movement based on its particular characteristics and sums the impact of all movements for each day of the period studied. The study period for calculating the NEF contours at the Island Airport is the seven busiest days of each of the three busiest months in a calendar year. The software also produces a contour map showing the average impact over the period. Thus, it produces **an estimate** of the noise impact that occurred using actual, historical data.

4.1.4 NEF Contours and the Tripartite Lease Agreement

As noted in Section 4.1.2, the Agreement uses NEF contours to control the noise impacts by establishing a maximum noise exposure (NEF) value for each point in the vicinity of the airport. Those values were calculated in 1978 by forecasting the conditions expected to prevail in 1990 and drawing a corresponding NEF contour map. That map, predicted in 1978 to represent 1990 conditions, was attached to the Agreement as a reference standard. Exhibit 4-2 presents a reproduction of this map.

Under the Agreement, the overall number and mix of aircraft movements at the Island Airport must be regulated so that the actual 28 NEF contour for any given year is "within the boundary of the official 25 NEF contour (estimated) for 1990." In other words, the daily cumulative impact of the noise produced by all aircraft movements, averaged over a defined period, is permitted to reach an NEF of 28 within the geographical boundary of the official 1990 25 NEF contour, implying that the parties to the Agreement allowed an increase of 3 NEF-units over those that had been predicted to prevail in 1990 if the 1978 traffic patterns had continued to that year. Also note that the actual 28 NEF contour is allowed to exceed the official 25 NEF contour between the points market X and Y on the map since this area is over water.

4.1.5 Views of the Interviewees Regarding the NEF Contour Methodology

In the conduct of our research, there were no strong sentiments expressed among the interviewees that the mechanisms used to control activity at the airport (including the ban on jet aircraft, the NEF contour limits, etc.) should be made more stringent. In particular, in our communication with the residents' associations and similar organizations (who might be logically expected to advocate such a change), representatives of these organizations did not generally seek to make the current control mechanisms more stringent but rather to ensure that compliance with them is enforced. Specifically, the representatives of these organizations generally recognize that the standards contained in the Agreement represent a compromise between their concerns and the objective of providing service to the travelling public, with both sides sacrificing some convenience (the residents have to tolerate noise and other irritations, while the travelling public has to put up with the lack of long haul aircraft service at the airport).

Accordingly, since a compromise was reached, the representatives indicated that they are primarily concerned that the standards (as well as the general intent embodied therein) be enforced (e.g., the possibility of permitting access by BAe146's, which were demonstrated during the 1990 Canadian National Exhibition airshow, would be perceived to be a step towards possible future expansion of the airport and the lessening of the protection afforded by the current standards). A more detailed list of the comments of the representatives of these organizations on the control mechanisms in the Agreement, is contained in Appendix F.

4.1.6 Standard Approach Paths

The violation of approach paths was cited as a major reason for noise complaints. The restrictions in the Agreement can only dictate which aircraft are allowed to use the Island Airport and the Agreement has no official jurisdiction over any aircraft once it has left the airport. Once the aircraft is airborne, it must comply with air regulations which are national

regulations developed primarily to ensure flight safety. The following discussion is presented to provide background on some of the terminology which is commonly used in discussing noise issues related to approach paths at the Island Airport. Specifically, we describe:

- The concept of standard approach paths.
- The enforcement of the standard approach.
- The concept of "noise sensitive areas."
- The Island Airport's "good neighbour" initiatives.

The Concept of Standard Approach Paths

A standard approach path is another term for an instrument approach which is described earlier in this report in Section 2.2.4. As discussed earlier, an instrument approach can be based on either an NDB, an ILS or an MLS. Instrument approach procedures are established based primarily on safety considerations (e.g., obstacle clearance) and are not necessarily designed to minimize noise impacts.

At the Island Airport, the instrument approach for the NDB was only published for general use in December, 1990. The MLS approach has been recently commissioned but is not expected to be published for at least one year.

An instrument approach is used only by aircraft flying under instrument flight rules (IFR). Since IFR movements account for only approximately 15 percent of the total itinerant movements at the Island Airport, the majority of all itinerant movements are conducted under visual flight rules (VFR) in which case the pilot is not required to follow any instrument approach procedure. Further, aircraft flying IFR in good weather conditions are required to follow instrument approach procedures only until the pilot has the airport in sight, at which time he can, and often does, cancel IFR in good weather conditions and complete the approach as VFR. It is possible, that in good weather conditions, no aircraft are required to follow the instrument approach procedures.

For a VFR approach to the Island Airport, the pilot can approach the airport from virtually any direction. The descent from cruising altitude is generally commenced at the pilot's discretion, taking into consideration passenger comfort, obstacle clearance, safety and noise abatement.

For an MLS approach, the aircraft generally receives radar vectors to a point within the vicinity of the airport and then turns onto a straight-in approach to the airport or cancels IFR when the airport is in sight. The majority of aircraft using the Island Airport do not

have the equipment on-board to take advantage of the MLS. Only Air Ontario is currently using this approach as a "company approach". (See Section 2.2.4.)

The descent of any aircraft (either IFR or VFR) from cruising altitude to the NDB or to the airport before commencing the approach is not subject to "standard" procedures. Therefore, an aircraft which is over residential areas (e.g., the Beaches) heading towards the Island Airport can fly as low as 1,000 above ground in good weather conditions without violating any air regulations.

In summary, the designation of a standard approach path does not necessarily have a significant effect on noise impacts around the airport since:

- Standard Approach Paths are determined based primarily on safety requirements and not noise impacts.
- The Island Airport is predominantly a VFR airport. VFR aircraft are not required to conduct a "standard approach."
- Even IFR aircraft can cancel IFR and proceed as VFR aircraft in good weather conditions.

The Enforcement of Standard Approach Paths

The Air Traffic Controller's role in the noise management process is misunderstood by many. The controller's responsibility is to ensure separation of the aircraft under his/her control from other known aircraft in the area. The controller is not an enforcement officer of the air regulations. Neither does he/she have the tools to monitor compliance with published approach paths.

In general, a tower controller provides separation based on position reports from the aircraft and the controller's ability to visually identify the location of each aircraft in the area. The tower controllers at the Island Airport do not currently have access to a radar display. It is expected that, in the near future, they will have a "slave" display of the radar which is now based either at Pearson or Hamilton. (A slave display provides an image of the radar which is being used by another controller at a different location.) However, even when this display is in place, the radar will be used only to assist the tower controllers in locating aircraft and not for ensuring separation or adherence to published approach paths.

Noise Sensitive Areas

The residential areas on the Island and on the south shore of the mainland have been recently identified by Transport Canada as "noise sensitive" areas on aeronautical charts of the Island Airport and area. The purpose of this designation is to alert pilots to the areas in

the hope that they will avoid overflying the areas at low altitude. Such areas are designated on an advisory basis only and are not subject to monitoring by any government agency.

The Island Airport's "Good Neighbour" Initiative

One means of attempting to control aircraft noise affecting the residential areas on the Island is through such initiatives as the "good neighbour" initiative undertaken by the Island Airport. For example, as part of the "good neighbour" initiative, local air traffic controllers have agreed that they will not provide a clearance to helicopters approaching the airport from the north to fly over the apartments along the shoreline unless they are medevac flights. By agreeing to this policy, local controllers have **voluntarily** accepted some responsibility for noise management.

4.2 Air Quality

Air emissions occur from aircraft engines whenever they are operating. Thus, emissions are associated with cruise, approach and take-off at airports, as well as taxiing and idling when on the ground. The quantity of emissions from a given aircraft depends on the engine type and number of engines.

The primary air pollutants associated with aircraft operations are hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO_X), oxides of sulphur (SO_X) and particulate matter. These are common urban air pollutants, also emitted from other mobile sources (such as cars, trucks, buses and railway locomotives) and stationary sources (such as electrical generating stations, heating plants and residential furnaces). Each of these pollutants is discussed in brief below.

- The hydrocarbon emissions mainly consist of residual fuel not consumed by the engines. In general, the individual hydrocarbon compounds are of relatively low toxicity. However, in the presence of sunlight they react with NO_X in the atmosphere to form ozone (O_3) and other oxidants responsible for urban "smog".
- Carbon monoxide is a product of incomplete combustion of the fuel. Studies indicated that long term exposure to carbon monoxide may aggravate cardiovascular health problems.
- Oxides of nitrogen are emitted predominantly in the form of nitric oxide (NO). However, after release to the atmosphere NO is rapidly oxidized to form nitrogen dioxide (NO_2). NO_2 is a reddish-brown gas with an pungent odor. At high concentrations, it is corrosive and an irritant. It is also known to be a precursor of "acid rain".

- Oxides of sulphur are emitted as sulphur dioxide (SO_2) and, to a lesser degree, as sulphur trioxide (SO_3). SO_2 is a colourless gas with a pungent odor and is a potential irritant. In the atmosphere it oxidizes to SO_3 which, in turn, combines with moisture in the atmosphere to form sulphuric acid. SO_2 remains one of the major urban air pollutants and is the major precursor of "acid rain".

- Particulate matter includes solid or liquid particles. Finer particles (less than about 40 microns in diameter) can remain suspended in the air for appreciable lengths of time and are known as suspended particulate (SP). SP contributes to degraded visibility in urban areas, while the very fine fractions can be inhaled by humans.

Local air quality in the vicinity of the Island Airport is influenced to some degree by emissions of HC, CO, NO_X, SO_X and SP from aircraft. However, the emissions of SO_X and SP are so small relative to emissions of the other three pollutants that they are generally not measured in air quality studies at airports and are not discussed further in this report.

In general, aircraft powered by jet engines emit HC and CO in quantities comparable to or lower than aircraft of similar size powered by turboprop or piston engines. However, emissions of NO_X are significantly greater from jets.

Aircraft emissions, however, are not the only source of emissions in the vicinity of the Island Airport. There are other significant sources of the same air pollutants in the area, including traffic on the Gardiner Expressway, traffic using other roads, such as Lakeshore Road and Bathurst Street, diesel locomotives using the CN railway tracks, and commercial and residential furnaces. Local air quality will reflect the cumulative impacts of all these sources and the general urban "background" levels.

In addressing the issue of air quality in the vicinity of the airport, we have addressed the following considerations:

- Whether or not air emissions from the current airport operations, in combination with other emission sources in the area, already cause undesirable effects on local air quality, thus placing possible future constraints on local emissions, including airport emissions.

- Which scenarios for the future operation of the airport, if any, are likely to have significantly greater impacts on local air quality than the current operations.

- To what extent the emissions associated with any of the scenarios for future airport operation are at all significant, compared with other major sources in the area, such as the Gardiner Expressway.

4.3 Road Traffic

Access to the Toronto Island Airport is provided via Bathurst Street, south of Lakeshore Boulevard West. The majority of vehicles travelling to and from the airport use the Bathurst/Lakeshore intersection to approach the airport. An alternative route to the airport is Queen's Quay for airport patrons travelling from the southeast end of the city. The boundary road intersections (Bathurst/Queen's Quay and Bathurst/Lakeshore) have traffic signals and are currently operating at acceptable levels of service for an urban environment. A site plan for road traffic is presented in Exhibit 4-3.

The airport is served by one access through the parking lot, to the ferry dock where taxis and private vehicles enter to drop off passengers. Airline shuttle buses also use this access to embark on the ferry in order to drop passengers directly at the terminal building on the Island.

4.4 Car Parking

The surface parking lot located at the ferry dock has 124 parking spaces. Exhibit 4-4 presents the layout of the parking area. Overflow parking is estimated to provide an additional 166 spaces to meet peak demand for a total of 290 spaces.

Under the terms of an agreement between the THC and Harbourfront (the Umbrella Agreement), the current parking facilities are considered to be temporary. When the Canada Malting lease expires in July 1991, the THC has six months to acquire a licence in perpetuity to construct a parking facility on this site on each side of Bathurst Street. The Umbrella Agreement also recognizes that such a facility may accommodate up to 400 parking spaces.

City council has proposed an amendment to the zoning by-law which would prohibit any construction above grade on this site. Since the site is only .83 acres, an underground parking garage would need at least three or four levels if 400 parking spaces are planned.

The estimated cost of such a facility is $8.0 million. This estimate does not include any expenditures which might be required to reinforce the seawall to allow the construction of such a facility because the repair and maintenance of the seawall is not the responsibility of the Island Airport.

Exhibit 4-3

Site Plan

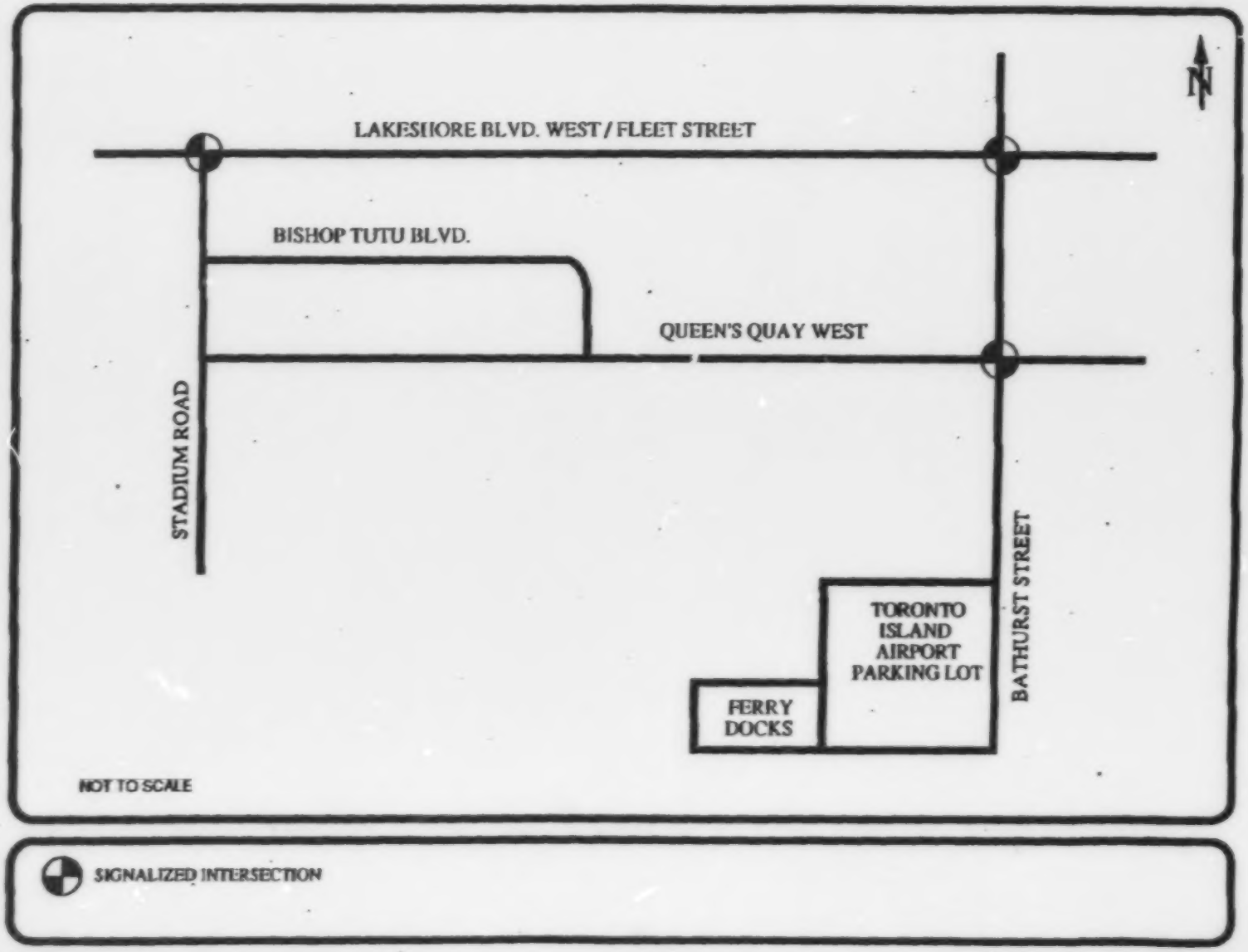
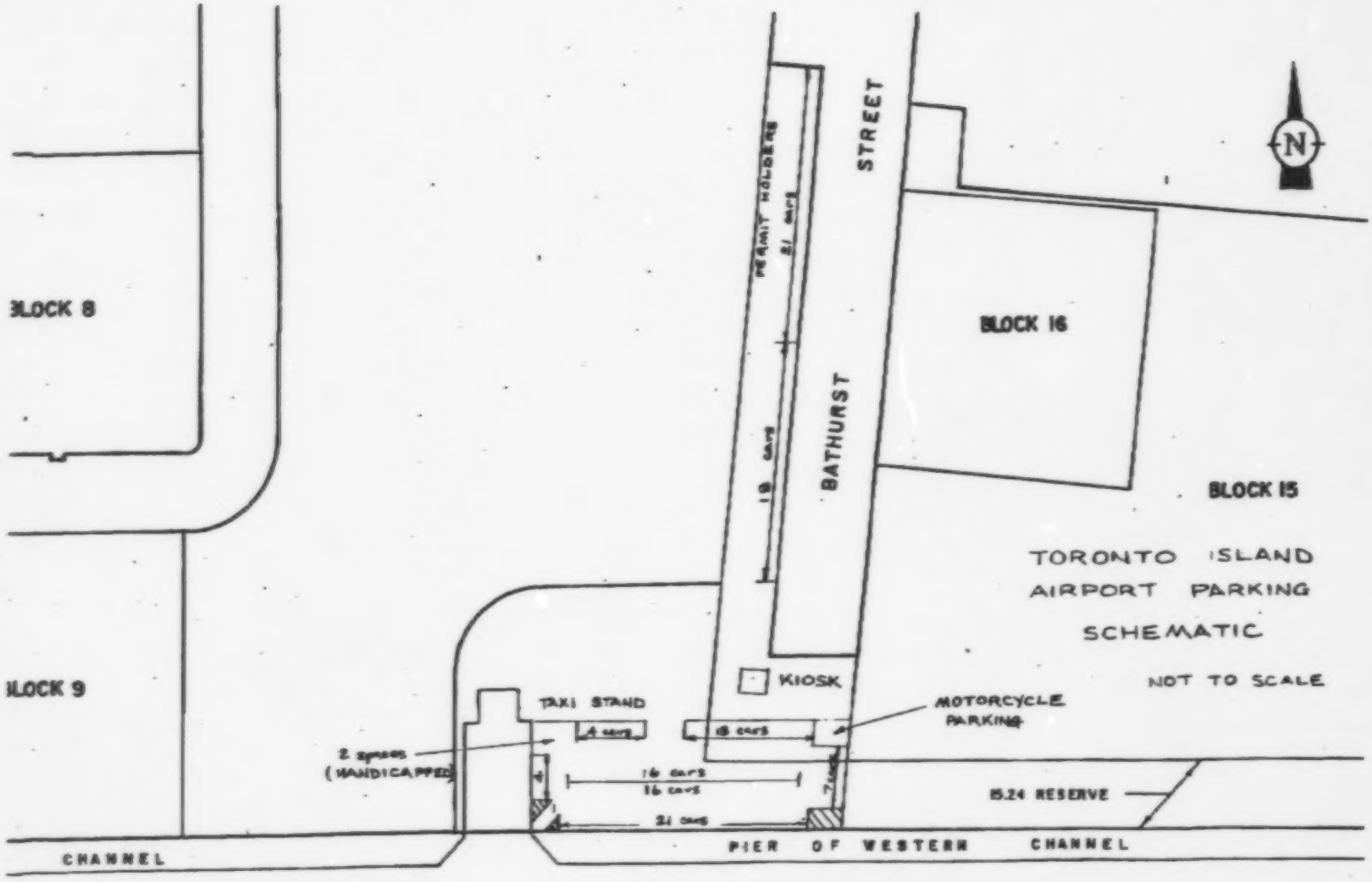


Exhibit 4-4

Parking Layout



4.5 Ferry Access

4.5.1 Current Ferry Service

Ferry service to the Island Airport is provided by the *Maple City*, a vessel owned and operated by the THC. Backup service is offered by the *Windmill Point*, which is also owned, operated and maintained by the THC. Both ferries are over 40 years old and require considerable maintenance.

The operating costs of the two ferries are subsidized by MTO as part of its road subsidy program for direct access to airports. This subsidy began as a temporary measure in the early 1970s and has continued ever since.

4.5.2 Ferry Capacity

The total passenger carrying capacity of the ferry is 100 passengers, in accordance with Canadian Coast Guard regulations and based on a three person crew. The ferry passenger mix can be made up of passengers on foot (standing or sitting), people being carried in the airline shuttle buses, and people in cars or trucks travelling on the ferry. Accordingly, the total number of people being carried on the ferry in all these modes cannot exceed 100 people.

Based on observations of ferry operations, it is estimated that up to 100 passengers can be carried on foot by the ferry under crush loading conditions. The vehicular carrying capacity of the ferry is six vehicles depending on the type of vehicles. For example, the ferry can hold up to six cars or light trucks, two buses plus two cars or light trucks, or one fuel truck.

The ferry currently runs on a 15 minute turnaround schedule during the course of the day with departures from the mainland occurring on the top of the hour and every 15 minutes thereafter. This turnaround permits a minor layover of approximately 5 minutes at the end of each round trip. However, during the morning peak period, the ferry service typically increases to a 12 minute turnaround. This was observed to occur between 8:00 and 10:00 a.m. This turnaround can be achieved by the reduction of the layover at the end of each round trip.

Based on the passenger carrying capacity of the ferry and the minimum turnaround constraints, the maximum one-way ferry capacity would be 500 ferry passengers per hour, based on a 12 minute turnaround and 100 passengers per trip.

Physically, it is possible for the ferry to achieve up to six round trips in one hour (i.e., a 10 minute turnaround). However, given the condition of the ferries and the need for some

contingency in the peak hour (particularly in marginal weather conditions), a maximum of five round trips per hour has been assumed for planning purposes.

4.5.3 Replacement of Current Ferry Service and Alternatives

The THC estimates that $500,000 will be required for major repairs to the aging ferries within the next five years, merely to keep them running. Although the ferries could theoretically be maintained indefinitely, their operating costs will eventually become prohibitive. It is expected that, even with these repairs, the ferries will need to be replaced within at most ten years. At that time, the vessels could be replaced with any one of the following options:

- **A larger ferry.** Current Coast Guard regulations require any replacement ferry to be larger than the *Maple City*. The actual size could be determined according to the capacity demanded by forecasts of commuter and General Aviation traffic as well as capital budgets available at the time. Such a ferry might be large enough to continue to provide scheduled service during bad weather. The estimated cost of two new ferries and new docks is approximately $12 million.

- **A pedestrian tunnel.** Such a tunnel might have people-movers, saving passengers from having to walk the distance from the mainland to the Island. Since emergency vehicles and fuel trucks need access to the Island Airport, some form of ferry service would still have to continue to provide access for emergency and supply vehicles. Based on the paper titled *"Toronto Island Airport: Access Overview — Working Paper"* issued in March 1988 by Hatch Associates (the Hatch Report), the cost of a pedestrian tunnel is estimated to be $23 million. (The Hatch Report estimated the cost of such a tunnel to be $19 million in 1987).

  One concern raised regarding a pedestrian tunnel is that passenger baggage processing would have to occur on shore, as passengers could not be expected to carry luggage on foot across moving sidewalks and escalators or elevators. Hence, in addition to moving sidewalks, baggage conveyors would also be needed. Arriving transborder passengers would have to be cleared on the Island and their baggage conveyed to shore after customs clearance.

  Another concern raised regarding a fixed link in any form is that some people may perceive that the Island would cease to be like an "island". This perceived change in status may affect the Island residents' perception of quality of life on the Island. (Quality of life is discussed in more detail in Section 4.11.)

  The two tunnel options (i.e., the pedestrian tunnel and the vehicular tunnel option discussed below) pose a special engineering problem. Current seaway regulations require that seaway depth (8.2 metres) be maintained in the Western

Gap. As long as this requirement is in effect, any pedestrian or vehicular tunnel would have to be sufficiently deep in order to maintain seaway depth in the Western Gap.

- **A vehicular tunnel**. This option is explicitly prohibited under the Agreement and is a higher cost option at an estimated cost of approximately $39 million as described in the Hatch Report. (The Hatch Report estimated the cost to be $32 million in 1987.)

  One problem with the vehicular tunnel is that there is limited space on the Island for vehicular parking. Access would likely be restricted to service and delivery vehicles (e.g., airline courtesy buses, taxis, fuel trucks, etc.). Most passengers and General Aviation users would likely not be allowed to take private vehicles onto the Island. Thus, unless ferry service were continued, vehicular access to the Island which is desired by some General Aviation users may not be provided.

- **A bridge**. This option, which is also prohibited under the Agreement, is another high cost option at an estimated cost of $35 million for a low level bridge and subsequent channel relocation as described in the Hatch Report. (The Hatch Report estimated the cost to be $29 million in 1987.) As with the tunnel options, the requirement to maintain the Western Gap as a seaway channel makes a low level bridge unacceptable. A bridge with higher clearance would result in materially higher costs. Further, as with the vehicular tunnel option, access to the Island by private vehicles would likely be limited.

It is not certain who would provide the capital to fund any of these options for access to the Island Airport. The Ministry of Transportation of Ontario has undertaken some responsibility for maintaining access to the Island Airport (e.g., MTO purchased the last ferry although it is now owned and operated by the THC) but it is not entirely clear how much funding, if any, it would be prepared to provide. This issue is discussed in more detail in Section 4.12.5.

4.6 Passenger Processing

Current Facilities

Passenger check-in facilities are currently available either on the Island at the main terminal building or the temporary terminal, or at the remote check-in facilities at Union Station. It is estimated that one-third of the passengers travel directly to the Island by private car or taxi. The other two-thirds use the facilities downtown and travel by airline bus to the airport.

All security clearance is provided on the Island. Although the idea of a "secure" bus from downtown has been suggested at times in the past, it has not been pursued due to the extra costs and the operational difficulties in ensuring that the bus remains secure enroute to the Island.

It is not expected that preclearance of U.S. Customs and Immigration will be provided at the Island Airport in the study horizon. This service is offered by special agreement at only five major Canadian airports: Pearson, Vancouver, Calgary, Edmonton International, Winnipeg and Montreal (Dorval). Each of these airports, with the exception of Edmonton International, currently handles over 120,000 enplaned transborder passengers per annum. Since the Island Airport handles approximately 50,000 transborder enplanements per year (based on City Express's performance in 1990), it is unlikely that the level of transborder passengers at the Island Airport will merit the establishment of a preclearance facility, especially when Toronto travellers are already provided with that service at Pearson.

City Express noted that its passengers disembarking at Newark were sometimes delayed at customs due to the arrival of several large European aircraft, just prior to City Express's arrival. The inconvenience suffered by the passengers in such a case may affect the market share of an air carrier servicing U.S. destinations from the Island Airport.

Future Requirements

The terminal building is a two-storey wood-frame building constructed in 1938. It has been the object of much criticism as an inadequate passenger processing facility. A number of proposals have been made to move or remove the building, to make way for a new terminal.

The terminal building is recognized in the Agreement as a significant historical structure and provides safeguards to retain the building. A new terminal building would have to comply with the conditions in the Agreement.

The space requirements for a terminal building at the Island Airport are somewhat less than the space requirements for a "typical" airport for several reasons:

- Two-thirds of the enplaning passengers use the downtown check-in facilities. These passengers only need security clearance and no other processing on the Island.
- Due to the large percentage of business travellers, passengers at the Island Airport are less likely to be accompanied by well-wishers or met by family and friends. Space for such non-passengers is included in "typical" space estimates for air terminal buildings.
- Business passengers generally have less luggage to check.

- There are only minimal commercial concessions (shops, restaurants) in the terminal.

Space requirements for the study horizon are discussed in more detail in Section 7.2.7.

4.7 Safety

In addressing the issue of safety, a number of different perspectives deserve consideration. Safety issues pertain to:

- Users of the airport
- Area residents
- Neighbouring organizations (e.g., Toronto Island Public and Natural Science School).

In the conduct of the assignment, the safety issues which were raised are:

- The greater the level of activity, the greater the probability that an accident might occur at the Island Airport. Residents have expressed concern about the safety of area residents and students and teachers at the Toronto Island Public and Natural Science School if activity is increased. As mentioned in Section 2.2.3, runway 15/33, the runway for which approaches and departure paths overfly the school, is only used for about 5 percent of total airport movements.
- As mentioned in Section 2.2.1, in bad weather conditions, the ferry cannot operate from its slip and must depart from and dock at the seawall on the mainland which is located to the east of the slip. This "off the wall" departure prevents vehicles from accessing the ferry. The Island Airport is a centre for air ambulance operations and if the ferry is operating "off the wall", an ambulance cannot access the Island to pick up an incoming patient. In such a case, the patient must be transferred on the ferry to the ambulance waiting on the mainland. This situation provides less than ideal service to the patient. However, the air ambulance always has the option of directing an incoming flight to either Buttonville or Pearson Airports.
- In the event of a major incident at the Island Airport, the lack of a fixed vehicular access to the Island may result in slower response times (e.g., longer travel time to the hospital and longer response time for emergencies vehicles which are not based on the Island).

4.8 Wildlife

According to a representative of the Toronto Ornithological Club, the Island Airport lies on a migratory route for many song birds, hawks and owls that follow the north shore of Lake Ontario. The heavy growth of trees and shrubs on the Island provides cover for the migrants — a place where they can rest and feed. Any expansion of the Island Airport that would reduce this cover would be harmful to the migrating birds as well as to any local birds that rest in the area.

Further, birds in the vicinity of any airport may pose a threat to aircraft due to the possibility of a bird strike. A concern was raised during the conduct of the study that with increased aircraft activity at the Island Airport, (especially of the heavier aircraft used for commuter services) preventive action (i.e., reducing the bird population) would be taken to minimize the possibility of a bird strike.

If jet aircraft were allowed to operate at the Island Airport, the possibility of bird strikes would take on more importance as a safety issue since birds can be "sucked into" a jet engine, causing damage to the engine.

4.9 Economic Impacts

An economic impact study commissioned by the Toronto Harbour Commissioners for the Island Airport was conducted in 1988 by Acres International Limited. The report on this study, "Toronto Island Airport Economic Impact Study" (the Acres Study), demonstrated that the Island Airport plays an important role in the aviation system of Southern Ontario as one of the busiest General Aviation airports in Canada.

In 1987, according to the Acres Study, the following direct, indirect and induced impacts were generated by the Island Airport (including spending by air travellers in the Greater Toronto Area):

- $183 million in business sales revenue;
- A contribution of $141 million to Gross Provincial Product;
- Over $74 million in wages and salaries, and in excess of 4,000 person-years of employment; and
- Tax earnings by all levels of government of over $32 million.

In addition to the impacts listed above, some travellers using the Island Airport benefit from the fact that the Island Airport is closer to Toronto's central business district than either Pearson or Buttonville. Any savings of time and money to travellers who work in or need

to commute to the downtown core (who are mostly business travellers) provides substantial benefit to the entire business community.

4.10 Other Environmental Issues

Air quality was discussed in detail in Section 4.2. However, some additional forms of pollution were identified during the course of this study as discussed below:

- Fuel which is sold at the Island Airport is carried across the Western Gap by truck on the ferry. The more activity there is at the Island Airport, the more fuel which is carried across and the greater the possibility of a fuel spill in the water. However, the ferry would probably have to sink before a fuel shipment crossing on the ferry would be spilled into the Gap. The possibility of constructing a pipeline for the transport of fuel to the Island Airport has been investigated by the THC but was found to be not feasible at current levels of activity.

- In the winter time, ice may accrue on the surface of aircraft. The presence of ice on an aircraft presents a safety hazard if the aircraft becomes airborne without removing the ice. Ice is removed by spraying glycol on the aircraft surfaces. During the winter period of 1988/89, a study was ordered by Transport Canada to quantify the glycol run-off into Lake Ontario from de-icing operations at the Island Airport. It was found that during this winter period the quantity of glycol used was such that no meaningful observations were recorded. We understand that further observations were to be made during the winter of 1989/1990. However, we have been unable to obtain the results of these additional observations.

  The THC advised us that glycol from de-icing operations at the Island Airport is now collected on a tarmac, drained into a catch basin and trucked off the Island. Therefore, this chemical does not seep into the ground where it might contaminate the ground water.

- As activity at the Island Airport increases, the ferry may be required to make more frequent trips or may be replaced by a larger ferry. In either case, the pollutants given off by the ferry will increase. It is not expected that such pollution is material in the context of overall operation of power vessels in the area.

4.11 "Quality of Life"

The "quality of life" of a community can be conceptualized and measured in terms of the chances of relatively good or bad things happening to members of the community. Two

kinds of social indicators have relevance to the quality of people's lives: objective and subjective. Objective social indicators include such measures as noise levels, pollution counts, traffic rate, number of acres of parkland per population, etc. Subjective reports of perceived well-being are usually operationalized as happiness with life as a whole (global satisfaction), or as happiness with certain domains of life. Such reports are called subjective social indicators. The assumption is typically made that the greater the percentage who report high levels of satisfaction or happiness, the greater the chances of any particular member of the community feeling well-off, indicating higher quality of life.

Quality of life may mean different things to residents in the same area. For example, many Island residents have chosen to live on or near the Island because of the park-like setting in the heart of the City. For these residents, the airport is an intrusion on the relative peace and quiet on the Island. This is also the case for individuals who use the waterfront for recreational purposes. For others, convenient access to an airport may be viewed as an advantage either for business or vacation travel or for recreational flying or flight training. For these residents, the airport is one more attraction to living or working on or near the Island. In assessing possible roles for the Island Airport, the City may wish to consider the conflicting objectives of these parties.

4.12 Financial Viability

The fourth question in the Terms of Reference is: What level of operation is necessary to make the Island Airport financially viable, today and in the future? In this section of the report, we present the issues surrounding the financial viability of the Island Airport. In the remainder of this chapter we present:

- A definition of financial viability for the purposes of this report.
- A discussion of the Transport Canada operating subsidy.
- A discussion of the THC's cost recovery obligations under the Agreement.
- An assessment of the uncertainties surrounding the demand for services and facilities at the airport.
- A discussion of financial issues relating to access and parking.

4.12.1 Definition of Financial Viability

In the Terms of Reference, "financial viability" is not explicitly defined. There are a number of ways in which the concept of financially viability can be considered. For example, as noted earlier in this report, the operation of the Island Airport is subsidized by Transport Canada. Consequently, the operations could be perceived as financially viable in terms of operating cash flow because the Federal Government currently covers any

operating shortfall. However, for the purposes of this report, the Island Airport is financially viable if it generates sufficient cash flow to meet annual operating obligations and to provide a reserve for future repairs and major capital expenditures required to maintain the existing capital assets over the long term.

The Terms of Reference refer only to the Island Airport and do not explicitly include the ferry operations. Although the ferry operations are closely tied to the operations at the Island Airport, the operating and capital costs associated with access to the airport have been excluded from our financial analysis for the purpose of determining financial viability because the ferry is a separate business entity and therefore, outside of the scope of this study.

However, we have included a discussion at the end of this chapter on the financial issues surrounding the operating and capital costs of providing continued access to the Island Airport.

Similarly, since parking revenues, expenses and capital costs related to the operation of the existing parking facility are not included in the airport financial statements, these costs (present and future) have not been included in our assessment of the financial viability of the Island Airport. Financial issues surrounding parking facilities are discussed at the end of this chapter.

Three additional capital items have been excluded from the assessment of financial viability. Specifically, the following three items have been excluded for reasons discussed below:

- A new terminal building.
- Expenditures for Air Navigation Services and Air Traffic Services.
- Return on land and capital.

A New Terminal Building

As discussed later in this report (see Section 7.2.7), it is expected that a new terminal building will be required before the end of the study horizon at the Island Airport in most of the scenarios examined. The definition of financial viability used in this report reflects only the funds required to maintain the existing capital assets. If a new or expanded terminal building is required, the funds required for this capital item would not be included in the assessment of financial viability. However, in the event that passenger traffic levels do increase substantially, it is expected that surplus funds (due in large part to the passenger user fee) will be generated from which such a project could be funded. If the passenger traffic levels do not increase substantially, there will be no requirement for this expenditure.

Expenditures for Air Navigation Services and Air Traffic Services

Major airside improvements such as new navigation equipment (e.g., the recently installed MLS) are currently funded by Transport Canada. It is expected that these types of expenditures will continue to be funded by Transport Canada during the study horizon and have thus been omitted from the assessment of financial viability.

Return on Land and Capital

Operators of private-sector airports require a return on land and capital assets. Although Transport Canada has made large capital expenditures at the Island Airport (e.g., for the new Air Traffic Control tower), it has not explicitly required a financial return on these assets. Nor has a financial return been required on the land owned by Transport Canada, the City or the THC. Thus, a return on land and capital assets has not been included in the assessment of financial viability.

4.12.2 The Transport Canada Operating Subsidy

An operating subsidy of the Island Airport is provided by the Ontario Region of the Airports Group (AG) of Transport Canada. However, for the purpose of assessing financial viability, this subsidy has been excluded. In other words, before the airport can be considered financially viable in the context of this report, it must generate sufficient funds that the operating subsidy is not required.

Transport Canada also provides funds to the Island Airport for capital costs. However, for the purposes of this report, we have assumed that all major capital expenditures will be funded from revenues generated by activity at the Island Airport.

In this section, the operating subsidy and the financial issues surrounding this subsidy are discussed to present a context for the following section on cost recovery.

The AG provides operating subsidies to five airports (including the Island Airport) in Ontario that are neither owned nor operated by Transport Canada. Each year, each of these airports submits a detailed budget of operating revenues and expenses to Transport Canada. In general, the budget is approved if the following conditions are met:

- Total projected revenue from fees and charges for the use of the Airport must be no less than the projected revenue would be if Transport Canada fees and charges were in effect.

- The level of service provided must be appropriate for the level of activity at the Airport in accordance with Transport Canada's standards and procedures for the operation of an airport.

In keeping with the Federal Government's efforts to reduce the federal deficit, the total funds available for the five airports have been sharply reduced. In 1985, the total budget was reduced by 25 percent at the initiative of Ontario Region. In 1986, the budget was reduced by a further 26 percent under a national initiative which affected all such airports in Canada. Consequently, the total subsidy available to each airport has decreased significantly. It is currently expected, based on discussions with Transport Canada representatives, that the subsidies will be eliminated completely within five years.

To replace the subsidies, Transport Canada is encouraging these airports to charge user fees. The most common of these fees is a charge made to commercial air carriers for each passenger carried on the airline (i.e., a passenger user fee).

Another means of reducing the operating deficit is to reduce costs. However, the operation of an airport incurs a significant number of fixed operating costs regardless of the level of activity at the airport. For example, in the 1990 budget for the Island Airport, approximately 80 percent of the total expenditures were estimated to be fixed expenses. Therefore, curtailing activity at the Island Airport is unlikely to reduce the operating deficit materially. On the contrary, since most revenues vary with activity (e.g., landing fees, fuel charges), a reduction in activity would cause a sharp reduction in revenues and a corresponding increase in the operating deficit.

4.12.3 Obligations for Cost Recovery under the Agreement

As noted earlier, operating costs at the Island Airport are generally fixed. The likely consequence for the Island Airport of the decreasing subsidies described in the preceding section, assuming no increase in activity or change in pricing strategy, is therefore a rising operating deficit. Under the Agreement, the THC must operate the airport "with an overall objective of cost recovery" (see Section 3.1). In other words, the THC is obligated by the Agreement to minimize the impact of the lost subsidy revenue by:

- Recovering costs from the users.
- Encouraging an increase in revenue generating activity.
- Changing the pricing strategy.
- A combination of the above.

The THC has introduced a number of revenue-generating measures for both General Aviation users and commuter air carriers which, according to the THC, are consistent with

the objective of operating the airport in a fiscally responsible manner. These measures are discussed below.

General Aviation Pricing Strategy

Aircraft using the Island Airport are subject to three fees:

- Landing fees.
- Fuel surcharge.
- Aircraft parking fees.

Beginning in early 1988, the collection of landing fees and other charges were more vigorously collected which led to the following exceptions to the payment of fees:

- Private-use piston aircraft are exempted from paying landing fees.
- Private-use turboprop aircraft which are based at the Island Airport and which pay rent for the parking of their aircraft to the airport management are exempted from paying landing fees.

Flight training aircraft pay an hourly fee in lieu of landing fees.

Commuter Traffic Initiatives

The potential for additional revenues is much greater from commuter air carriers than from General Aviation aircraft. For example, in 1992 of the first scenario examined in this study, the expected revenue from the commuter air carriers (i.e., landing fees, fuel charges and passenger user fees) at the Island Airport is approximately 83 percent of total revenues. Air carriers are also generally less price sensitive than most General Aviation operators. In other words, an increase in fees and charges to air carriers is less likely to cause a decrease in activity than an increase in General Aviation user charges at the Island Airport. The price sensitivity of the two user groups is discussed in more detail in Section 4.12.4.

In order to increase the potential for revenues from commuter air carriers, the THC, in 1989, approved applications from Air Ontario, Canadian Partner and Intair to operate out of the Island Airport beginning no sooner than April 1, 1990. To date, only Air Ontario has exercised this right. These rights for Canadian Partner and Intair expired November 30, 1990, but are expected to be renewed if a new application is made. (Note that Intair no longer operates out of Toronto and is, therefore, unlikely to reapply for landing rights at the Island Airport.)

In addition to allowing more commuter air carriers to use the Island Airport, the THC also introduced a user fee of $1.50 per passenger on April 1, 1990. This fee was expected to

generate approximately $420,000 in additional revenue in 1990. The THC increased the passenger user fee to $3.00 per passenger on January 1, 1991.

4.12.4 Demand Uncertainties

The impact of the initiatives described in the preceding section will depend on the actual passenger traffic and aircraft movements at the Island Airport during the study horizon. Although activity forecasts are presented for the Island Airport under each development scenario, both commuter and General Aviation traffic are subject to much uncertainty. The forecasts presented in Chapters 8 through 10 are long term in nature and are based on certain assumptions concerning the demand for and supply of services in the Region. Many factors may affect the portion of the regional traffic which chooses to use the Island Airport and the types of services and facilities which must be provided to serve this demand. In this section, we present a discussion of the following factors:

- Price sensitivity of the users.
- Potential competition from other airports.
- Potential competition from other modes of transportation.
- Other Federal Government initiatives.

Economy-related Risks

The growth in passenger air travel at Pearson has historically been highly correlated to the real Gross Domestic Product. The Island Airport's commuter traffic can be expected to follow the same patterns. Thus, the expected level of commuter passenger traffic at the Island Airport is sensitive to overall economic performance and the business cycle.

General Aviation traffic is even more sensitive to the business cycle, as shown in Exhibit 2-8. For example, as the economy shrank in the early 1980s, itinerant General Aviation movements at Toronto Area Airports fell by 10 percent between 1980 to 1982.

Price Sensitivity of the Users

Price sensitivity describes a user's response to a change in price. If a user is price sensitive, then an increase in price will cause a decrease in activity, resulting in either a reduction or an increase in total revenue depending on how strongly the user reacts to the price increase. If a user is not price sensitive, then an increase in price will result in the same level of activity but an increase in total revenues. The relative price sensitivity of General Aviation traffic and commuter traffic is discussed below.

General Aviation

Itinerant General Aviation traffic at the Island Airport has demonstrated that it is extremely price sensitive. When the Island Airport began stricter collection of fees, the number of itinerant General Aviation movements at the Island Airport fell 51 percent from 1987 to 1989, as shown in Exhibit 2-8. It has been suggested that many of the movements relocated to Buttonville, as shown in Exhibits 2-8 and 2-9.

As discussed in Section 2.3.3, 63 percent of the Island Airport's General Aviation traffic is piston aircraft which are generally used for flight training and recreational flying. These activities are generally very price sensitive. The corporate aircraft segment of the General Aviation market is less price sensitive, as those users tend to value their time very highly (evidenced by their decision to operate a private jet instead of using commercial air carriers). However, the Island Airport cannot serve this market segment very well, as jets and some larger turboprop aircraft are not permitted to use the Island Airport. As a result, the General Aviation traffic that the Island Airport can serve well is the extremely price-sensitive segment of the market (which is largely exempt from fees).

Commuter Air Carriers

The reaction of a commuter air carrier to an increase in user fees depends on a number of factors such as:

- The carrier's ability to pass on the cost increase to the passenger in the form of higher ticket prices.
- The magnitude of the increase relative to the ticket price.
- The profitability of the carrier's activity on any given route.

The passenger user fee must be charged to the airline and not to the passenger since if the passenger were charged, the fee would be considered a "tax". The THC cannot levy a "tax" and thus must charge the airline and not the passenger directly. Since Air Ontario tends to match Air Canada prices for service out of Pearson to Ottawa and Montreal, it has limited potential to pass the user fee onto the passenger.

The passenger user fee of $1.50 on a full fare round-trip ticket to Ottawa is less than 1 percent of a fare of $358 with Air Ontario (November, 1990 prices and fee schedule).

In spite of the presence of the passenger user fee, Air Ontario has not reduced the number of flights operating out of the Island Airport; rather, it increased its

activity in the fall of 1990. This action suggests that, on the existing routes, Air Ontario was not sensitive to the level of user fee in 1990. It is too early to assess the impact of the doubling of the passenger user fee on January 1, 1991.

It is possible that, at current rates, the added cost of operating out of the Island Airport may affect decisions to offer service on new routes. In other words, the volume of traffic required to provide a "reasonable" return on a new route may increase, resulting in a delay in the introduction in the service until demand is greater on that particular route. Therefore, the air carriers may be sensitive to the passenger user fee when considering the introduction of service on marginal routes. Similarly, new air carriers may hesitate to begin operations at the Island Airport if charges were to be considered too high.

At the same time, an air carrier starting a new service in Toronto would examine the total cost of its operations at the alternative airports (i.e., it would compare the total cost of operating at Pearson, Buttonville or the Island Airport). The passenger user fee at the Island Airport is just one parameter in such an analysis.

Potential Competition from Other Airports

The level of activity at the Island Airport is affected by the supply of airport capacity in the Region. The three major airports, which are the subject of much uncertainty at this time, are Pearson, Buttonville and, potentially, a proposed airport on Pickering lands.

Pearson

Pearson is currently experiencing severe restrictions on its capacity, as discussed in Chapter 5. If the capacity problems are corrected, the demand at the Island Airport for commuter traffic and, to a lesser degree for General Aviation traffic, could fall. Pearson is currently handling a maximum of 76 movements (71 air carrier and 5 General Aviation movements) per hour in the peak hours. Since demand for air carrier movements at Pearson is generally satisfied in the peak hour, it is likely that any major increase in capacity at Pearson would allow a marked increase in General Aviation traffic. Thus, if Pearson were able to operate under favourable weather conditions at its rated capacity of approximately 90 to 96 movements per hour, much of the Island Airport traffic of 30 to 40 peak hour movements could, in theory, be accommodated at Pearson.

Buttonville Airport

Buttonville Airport is a privately owned airport in Markham, north of Toronto. The owner currently estimates that the land is worth approximately $150 million if it is rezoned for industrial development. An application for rezoning was scheduled to be presented to the Ontario Municipal Board in October, 1990.

However, the hearing was postponed at the owner's request in light of initiatives under consideration by the regional and provincial governments regarding airport ownership in Southern Ontario. If these initiatives do not result in a commitment for purchase of Buttonville Airport by the public sector, the airport's owner has announced that he will start winding it down.

Canadian Partner has recently begun offering commuter service from Buttonville to Ottawa and Montreal. This service competes with the Island as an alternative to Pearson although it would appeal more to passengers originating from the neighbourhoods and commercial developments surrounding Buttonville Airport than to passengers originating from downtown Toronto.

If Transport Canada were to purchase Buttonville, it is likely that the airport would continue to operate in the long term. However, it is unlikely that Transport Canada will purchase the airport to maintain it as a "reliever" airport to Pearson for the following reasons:

- The main runway at Buttonville is 3,750 feet long. Although many business jets can land and take off within this distance, some of the larger aircraft can operate only at a reduced load. Expansion of the two runways is restricted by the presence of Highway 404 to the west, 16th Avenue to the north, a deep gulley to the northeast, and an industrial development to the southeast. The expansion potential for this airport is therefore limited.
- The Federal Government is currently "devolving" its responsibility for operating airports (a step towards privatization). The purchase of an airport from the private sector would be contrary to current Transport Canada policy.
- The $150 million might be better spent on other airport development initiatives which would increase system capacity, such as a new runway at Pearson or a new airport on the Pickering lands.

If Buttonville were closed, the demand for General Aviation at the Island Airport would probably increase. The expected increase is discussed in greater detail in Chapter 10.

Pickering

In 1974, Transport Canada proposed that a major international airport be constructed in Pickering on land expropriated by Transport Canada for that purpose. The project was aborted due to strong lobbying against the airport by local residents. There has been much publicity recently about the possibility of constructing a new General Aviation airport on the Pickering lands. A recent

report to the Greater Toronto Area Coordinating Committee[2] recommended that such an airport be built on the Pickering lands, which are still owned by Transport Canada.

Given the length of time required to plan such a facility, we have assumed that an airport will not be built at Pickering for at least ten years. For that reason, we have not considered the impact of this potential competitor in the development scenarios.

Potential Competition from Other Modes of Transportation

In addition to competition from other area airports, the Island Airport is potentially exposed to competition from other modes of transportation such as:

- A high speed rail service between downtown Toronto and Ottawa/Montreal.
- A rapid transit link to Pearson.

The impact of these proposed services is discussed below.

The Impact of High Speed Rail Service

Proposals for building a high speed rail line between Windsor-Toronto-Ottawa-Montreal-Quebec City have been examined by the Federal Government and VIA Rail in several studies during the 1980's and are currently under examination by an Ontario-Quebec Provincial Task Force. Various systems have been proposed, including trains travelling at speeds between 200 and 300 km/hour cutting the travel time between Toronto and Montreal to less than 3 hours. It has been suggested that such a service would divert substantial portions of automobile and air traffic to rail. Air traffic at the Island Airport would be particularly vulnerable, as Union Station is the same point of check in for many of the users of the Island Airport. Considering access time to the airport in Toronto (i.e., the Island Airport), flying time to Montreal and egress time from Dorval Airport to downtown Montreal, a 3-hour train ride would not represent a significant time penalty for a downtown to downtown trip between Montreal and Toronto. Consequently, as people generally try to avoid transferring twice enroute and

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2 *Various levels of government have created a GTA Committee to study areas which affect all levels of government. The committee is actually set up as two bodies: one comprises elected officials and the other administrative officials from all represented governments. The latter committee is the Greater Toronto Area Coordinating Committee (GTACC). A subcommittee of the GTACC has been set up to study the airport issue and is called the Greater Toronto Area Airports Committee (GTAAC).*

assuming that the fares were to be competitive, a significant portion of travellers may choose a high speed train.

The significance of a high speed rail service as a competitor to air travel, is a function of the competitiveness of the rail fares relative to the existing air fares. Recent studies indicate that if the rail service were based on the full cost recovery principle (including the recovery of capital costs), the rail fares would have to be much higher than air fares for the same trip. Consequently, the service would not be financially competitive under full cost recovery principles.

In order to make the service financial competitive, significant government subsidies would be required. In spite of the potential social, economic and environmental benefits of a high speed rail service over air transportation, it is uncertain, under the current economic climate, whether governments would be willing to provide the required subsidies in order for the high speed rail service to be established within the time horizon of this study.

Rapid Transit Link to Pearson

Another threat to the level of traffic at the Island Airport is the construction of a rapid transit link from Union Station to Pearson. Such a link might follow the route of the existing GO Train service to Georgetown which runs only about 2 kilometres north of the passenger terminals at Pearson.

Once at Union Station, air passengers might find it more convenient to board the train and travel to Pearson instead of going to the Island Airport to catch a plane that leaves to the same destination. With the high frequencies of air service provided at Pearson, many passengers might be diverted from the Island Airport as a result of a rapid transit service.

The key to the success of the rapid transit link would be the interface between the trains and the passenger terminals at Pearson. In order to attract sufficient passengers to make the service feasible, the trains must deliver the passengers directly to the terminals with a minimum walking distance between the train stops and the terminal buildings. If passengers have to take a shuttle bus between the rail terminal and the airport terminals, the patronage of such a service might be small, as most people would not like double interfaces, with waiting times at each interface. The construction of a transit line through the web of the existing ground transportation system at Pearson might be quite costly, in addition to the costs of the 2 kilometre rail connection between the existing CN line and the airport terminal buildings. Because of those costs, it is likely that the rapid transit link would have to be subsidized.

With the expectation of such subsidies, the THC would have an argument for requesting compensation for any loss of passengers at the Island Airport caused by a rapid transit link to Pearson. The justification for such a subsidy would be the rightful claim that it is not possible to expect full cost recovery from a facility that has to compete with a government-subsidized service.

The Toronto Transit Commission has recently commissioned Terms of Reference for a study which will provide an overview of rapid transit in the Toronto region. As part of this study, we understand that the consultants will examine the environmental impacts of a rapid transit link along Eglinton Avenue connecting Pearson and the Eglinton West Subway Station. In addition, the Province and Transport Canada have jointly commissioned a study to analyze road, rail and rapid transit options for improved access to Pearson.

The success of a rapid transit link between Pearson and the Eglinton West Subway station depends on the same factors as one linking Pearson to Union Station and is also dependent on the interface between the subway station and the airport terminal buildings. A subway link would suffer from two additional drawbacks:

- Because there may be a number of steps between the Eglinton West Station and Pearson, travellers from many parts of Toronto may still find that the Island Airport offers considerable time savings.
- The traveller would face one more interface at the transfer from the subway station at Eglinton West to the transit link to the to the airport. The additional change of vehicle and the waiting time associated with it, lessens its attraction to air travellers, particularly those carrying baggage.

In summary, it may be expected that a purposefully-designed rapid transit system to Pearson could siphon off significant numbers of passengers from the Island Airport. Conversely, if the transit link were not built in a manner that would provide maximum convenience to passengers, it may not pose a significant threat. It is uncertain when such a system would be built, if at all.

Other Financial Viability Issues

There are two Federal Government initiatives which are currently under consideration which may affect the future viability of the Island Airport:

- The possible transfer of Transport Canada airports to local airport authorities and the application of this policy at Pearson.
- The current negotiations regarding an "open skies" policy for North America.

Local Airport Authorities

In 1987, Transport Canada announced that it would consider transferring its airports to local airport authorities (LAA's) under terms and conditions spelled out in its policy statement. To date, no airports have been transferred, but negotiations are now underway in Vancouver, Edmonton, Calgary and Montreal between Transport Canada officials and the LAA's. In these instances, the LAA's are pursuing the transfer of not just the major Transport Canada airport(s) in their cities but also the smaller airports located nearby. In the case of Toronto, an LAA has not been formed but there have been various discussions regarding the transfer of Pearson (and possibly other Toronto Region airports) to municipal and/or provincial jurisdiction (e.g., this issue may be within the scope of the Greater Toronto Area Coordinating Committee). Recently, Transport Canada announced that it will call for proposals from the private sector for the privatization of Terminals One and Two at Pearson. The proposal call procedures and documents are now being prepared.

It is uncertain at this time whether Pearson will be transferred to municipal/provincial/LAA ownership and operation (if at all) and whether the proposal call will generate acceptable proposals from the private sector. Should either of these occur, it is possible that facilities at Pearson will be upgraded and that the airport will compete more aggressively for the passenger and General Aviation traffic handled by other Toronto Regional airports, such as the Island Airport. At the same time, it is possible that a new owner of Pearson will also seek to acquire the Island Airport.

"Open Skies" Negotiations

The Federal Government is currently negotiating with the U.S. Federal Government for an "open skies" policy for North America, which is expected to result in less Federal Government regulation in the North American air transportation marketplace and greater competition among carriers. These negotiations are in their early stages, and it is uncertain at this time as to what items will be within the scope of such a policy. Accordingly, it is premature to assess in detail the possible impacts of an open skies policy on the Island Airport at this time. However, note that since air carriers are not precluded from using the Island Airport by Federal Government policy, it is unlikely that the decrease in Federal Government regulation associated with an open skies policy would lead to more air carriers serving the Island Airport. In any case, any air carrier would still have to seek permission to use the Island Airport and would have to comply with all the terms and conditions of the Agreement.

4.12.5 Financial Issues regarding Access and Parking

As explained in Section 4.12.1, ferry and parking operations have not been included in our assessment of financial viability. However, there are a number of financial issues surrounding these operations which should be highlighted. These issues are presented in the remainder of this chapter.

Ferry Operating Costs

It is not entirely clear what would happen to the ferry service if the Island Airport were closed. In theory, the existing service could be reduced (e.g., fewer trips per day or no service in the winter) or eliminated. If the current ferry service were discontinued, access to the Island would still be provided from other ferries. The need for the existing service and the level of service needed would depend entirely on the new use of the Island lands. Thus, it is difficult to attribute the entire cost of the ferry operations to the airport operations, although it is likely that there would be cost savings associated with the reduction or elimination of service if the lands were not used as an airport, especially at the current level of activity.

The ferry operations are funded separately from Airport operations by the revenues from the ferry and an operating subsidy from MTO. The operating deficit of the ferry has increased significantly over the past few years and MTO has indicated that this level of subsidy may not continue. Therefore, the THC may be required to:

- Reduce ferry operating costs (e.g., by reducing the level of service).
- Increase ferry revenues (e.g., through a higher user charge).
- Partially fund the ferry operating deficit (either with surplus revenues from the airport operations or from the THC's overall income pool).

For the purpose of this report, we were unable to determine with any certainty the likely magnitude of a potential subsidy of for ferry operations from airport operating revenues and thus have not quantified this potential. However, it should be remembered that the need for such a subsidy may exist.

Ferry Capital Costs

As mentioned in Section 4.5, the existing ferry will likely be replaced within 10 years. Although MTO provided the funding to purchase the last ferry, it is not certain if this capital subsidy would be available in the future for the replacement of the existing ferry. As with the operating costs, this potential future expenditure has not been quantified and is not included in our assessment of financial viability.

The Hatch Report provides estimates of the cost of replacing the existing ferry with either a larger ferry or a pedestrian tunnel (as discussed earlier in this report in Section 4.5). The former option would require relatively low capital costs with continuing high operating costs. The second option, a pedestrian tunnel, would require relatively high capital costs but would have low operating costs. At the time that the ferry is replaced, it would be necessary to determine which option is the more attractive option financially over the long term. If operating costs were significantly reduced through the construction of a pedestrian tunnel, it is possible that MTO might continue the same level of subsidy by providing a reduced amount for operating costs and the balance for the financing of capital costs.

Parking Facilities on the Mainland

As discussed in Section 4.4, the Umbrella Agreement allows for the construction of a parking facility of up to 400 spaces. Certain constraints on the facility require that the facility be an underground garage with up to 4 levels. Such a facility is significantly more expensive than a surface lot and the construction of such a lot would result in either higher charges for parking or an operating deficit.

At the time when the decision to construct a parking garage is made, it is assumed that the facility will not be constructed unless the resulting increase in revenues (in terms of more spaces and potentially higher parking charges) will generate an adequate return on the investment. In other words, unless the users are willing to pay for the improved service, it is unlikely that the improvements will be undertaken.

In the case of parking, several alternatives are available to the traveller who can:

- Use airline courtesy buses from downtown.
- Use public transit.
- Park in neighbouring parking lots and walk to the ferry.

Therefore, even if parking revenues and costs (both operating and capital) were included in the airport operating statements, the construction of a new facility is not expected to negatively impact the cashflow generated by the Island Airport. The facilities would not be expanded unless the expected net cash flow from the new facility would be zero or positive.

5. Possible Roles for the Island Airport

Under the terms of the Agreement, the Island Airport could fill one of four potential roles within the Toronto Area Airport System. It could be:

- A reliever airport for Pearson,
- A commuter airport with limited General Aviation traffic,
- A General Aviation airport with limited commuter traffic, or
- A combined commuter and General Aviation airport.

Each of these possible roles is examined in this chapter.

5.1 The Island Airport's Potential as a Reliever Airport

The search for a reliever airport for Pearson has become a critical issue over the past few years. The increasing congestion and steps taken by Transport Canada to manage demand at Pearson have received wide publicity, including suggestions that the Island Airport may relieve some of that congestion. In order to understand that potential of the Island Airport, we put the capacity crisis in context by discussing the following issues:

- The causes of the congestion.
- The actions taken by Transport Canada to address the congestion.
- The response of users to the actions taken by Transport Canada.

5.1.1 Causes of Congestion at Pearson

The congestion at Pearson is due to a sharp increase in demand (measured in aircraft movements) that coincided with a curtailment in the supply of air traffic services (such as air traffic controllers). The increase in demand for and the decrease in the supply of services is discussed below.

Increase in Demand

The annual passenger traffic at Pearson grew at an average annual rate of 8.3 percent between 1984 and 1988. Thus, passenger traffic increased by a total of 38 percent in just four years. Much of the increase was accommodated by the introduction of more flights.

In addition to the underlying growth in passenger traffic, deregulation of the airline industry changed the pattern of aircraft movements in Canada. Under the new freedoms, several airlines began offering service on routes previously served by only one airline. This additional service was generally offered by small airlines using small turboprop aircraft. That resulted in more frequent flights carrying essentially the same passenger traffic on those routes. At the same time, these small airlines used their aircraft to initiate service on routes that were unprofitable for jet service.

As a result of more frequent service and service on otherwise uneconomic routes, the number of itinerant air carrier movements at Pearson increased substantially. The combination of growth in passengers and the shift to smaller aircraft resulted in an annual average growth of itinerant air carrier movements of 8.2 percent between 1984 and 1988. (Note that without the shift to smaller aircraft, the increase in the number of movements would have been substantially less than the increase in passenger traffic as part of the growth in the passenger traffic would have been accommodated by using large aircraft on a particular route.)

Restrictions on Supply

In response to the growing federal deficit, Transport Canada sharply reduced its recruitment and training of air traffic controllers in the early 1980s. The freeze on hiring resulted in the number of controllers remaining unchanged at Pearson, in a period when aircraft movements grew significantly. Since aircraft movements are the primary measure of an air traffic controller's workload, the demand for controllers eventually exceeded the supply.

This shortage was aggravated by the following factors:

- Before a controller is certified to work at Pearson, he or she must receive up to two to three years training. The training period is shorter for a fully trained controller working at a different airport and transferring to Pearson but could still take up to one year. The long lead time for training new controllers means that the shortage cannot be alleviated in the short term.
- The high cost of living in the Toronto region has made it a relatively unattractive location for air traffic controllers. Pearson is the busiest airport in Canada, and the premium paid to controllers to work at Pearson may not have been perceived as sufficient compensation for the additional workload and the higher cost of living.

5.1.2 Remedial Actions Taken by Transport Canada at Pearson

The increasing demand for services at Pearson combined with the shortage in air traffic controllers resulted in unacceptable delays to air travellers. In response, Transport Canada

limited the number of aircraft movements per hour at Pearson to 70 in January 1989. Previously, Pearson had been handling up to 93 movements per hour. Of the 70 movements, 66 were reserved for air carriers and 4 for General Aviation activity. In September 1990, the limit was increased to 76 movements per hour (71 for air carriers and 5 for General Aviation).

In addition to limiting the hourly demand for air traffic services, Transport Canada has increased its Air Traffic Controller recruitment and training efforts nationally. These efforts have been only moderately successful, and the staffing shortage is expected to persist for some time.

5.1.3 Response of Pearson Users to Actions Taken by Transport Canada

After the imposition of the limit on hourly movements, the annual itinerant movements at Pearson grew by only 0.2 percent from 1988 to 1989 compared to a growth rate of 10.8 percent from 1987 to 1988. The largest drop in activity was for piston aircraft, which fell by 8,200 movements (37 percent) in 1989, followed by all aircraft types under 5,670 kg, which fell by 9,500 movements (28 percent).

The aircraft that left Pearson were from the General Aviation segment. As General Aviation activity at Pearson dropped, activity rose at Buttonville by 9,000 movements (15 percent) for piston aircraft and by 1,200 movements (16 percent) for all aircraft types under 5,670 kg from 1988 to 1989.

Contrary to what might have been expected, activity at the Island Airport continued to decline in both of these categories during this period. The shift in traffic within the Toronto Region is shown in Exhibit 5-1.

5.1.4 The Island Airport's Role as a Reliever of Pearson

In considering the relief that the Island Airport provides to Pearson, two different scenarios must be assessed:

- Pearson, given its current facilities and resources, is at capacity during peak periods and cannot handle more traffic at those times.
- Pearson adds to its current facilities so that it has sufficient capacity to handle more than its forecast peak period demands.

Exhibit 5-1
Shift in Itinerant Aircraft Movements
At Toronto Area Airports

Piston Aircraft

Year	Total Area	Pearson	Island Airport	Buttonville	Hamilton	Oshawa
1989	180,094	13,994	31,979	71,237	33,226	29,658
1988	202,184	22,205	50,461	62,243	4,939	32,336
1987	217,697	30,147	62,182	60,749	31,227	33,392
1986	214,430	35,414	59,715	57,266	29,828	32,207

All Aircraft below 5,670 kilograms

Year	Total Area	Pearson	Island Airport	Buttonville	Hamilton	Oshawa
1989	47,460	23,938	7,068	8,327	6,497	1,630
1988	56,572	33,445	7,526	7,177	7,498	926
1987	65,540	39,732	12,560	6,014	6,085	1,149
1986	54,223	36,284	8,620	5,173	3,094	1,052

All Aircraft types, all weights

Year	Total Area	Pearson	Island Airport	Buttonville	Hamilton	Oshawa
1989	571,233	348,264	51,134	82,881	51,381	37,573
1988	580,867	347,536	73,744	70,288	48,921	40,378
1987	556,885	313,764	93,705	67,496	41,700	40,220
1986	522,300	301,169	81,980	63,162	37,998	37,991

Source: Aircraft Movement Statistics, Transport Canada Aviation Statistics Centre.

Pearson at Capacity

As discussed previously, Transport Canada has limited the number of aircraft movements per hour at Pearson in response to the shortage of air traffic controllers at the airport. Accordingly, the airport is operating at its current capacity until the air traffic controller shortage problem is resolved. When that occurs, Pearson will still need additional runways to accommodate its traffic growth at service levels acceptable to the travelling public. If the current Environmental Assessment Review Panel does not endorse new runways at Pearson and none are built, then the airport will have to continue to constrain future traffic growth at least during peak periods. Some of the traffic that would otherwise have used Pearson would either move to another Toronto Region airport or not travel to/from Toronto at all. Some of the former might logically be expected to move to the Island Airport which in this manner, might be considered to "relieve" Pearson.

The type of traffic that might be accommodated at the Island Airport under continued conditions of constraint at Pearson consists of both commuter traffic and General Aviation traffic. However, the relief provided by the Island Airport cannot be expected to be very significant. Commuter airlines carry both passengers who are originating or terminating their trips in Toronto and passengers who are connecting to other flights in Toronto. Commuter flights which primarily handle the former have probably, to a large extent, already left Pearson and provide service out of the Island Airport, Buttonville and Hamilton; therefore, Pearson probably does not require much relief for its originating and terminating commuter traffic. Commuter flights which handle the latter cannot practically be accommodated at another area airport (i.e., other than at Pearson), as passengers would find it very inconvenient to have to fly to a Toronto Area Airport and be transported across the Region to Pearson in order to connect with another flight. (The same is true of the return trip in this example.)

The same conclusion holds for Pearson's General Aviation traffic. As shown in Exhibit 2-8, in the first full year after peak hour constraints were imposed at Pearson in late 1988 (limiting General Aviation traffic to at most four movements in any hour in which air carriers used their allocation of 66 movements), General Aviation traffic at Pearson dropped substantially (approximately 11,600 itinerant General Aviation movements). However, on the basis of the data presented in the same exhibit, the traffic which did not disappear entirely from the area apparently shifted to Buttonville (which increased its itinerant General Aviation movements by approximately the same amount as the decline at Pearson) and not to the Island Airport (which suffered a decline of approximately 21,000 itinerant General Aviation movements).

Given the magnitude of the shift in traffic out of Pearson which resulted from the access restrictions imposed at Pearson, it is likely that most of the General Aviation operators which could leave Pearson for either Buttonville or the Island Airport (e.g., any aircraft which could safely operate on a runway of 4,000 feet or less) did leave at that time. If General Aviation activity is further restricted at Pearson, it is expected that the current

General Aviation operators at Pearson will either continue to use Pearson within the tighter restrictions or potentially leave the Region altogether.

Capacity Added to Pearson

Alternatively, if the air traffic controller shortage problem is eliminated and the current Environmental Assessment Review process results in an endorsement of the construction of new runways and the runways are built, Pearson will need no relief from the Island Airport or any other airport in the Toronto Region until well into the next century. This is true even if the Island Airport were to close, as discussed below separately for commuter traffic and General Aviation traffic.

As discussed in Section 2.4.1, if not for the financial difficulties experienced by City Express, the Island Airport would have been expected to handle over 400,000 enplaned and deplaned passengers in 1990. Because these passengers are processed at the Island Airport, the Island Airport relieves Pearson of the burden of processing these travellers. However, the relief that the Island Airport provides to Pearson amounts to approximately six months of passenger growth at Pearson (based on annual enplaned and deplaned passenger traffic at Pearson of approximately 20 million and annual growth of approximately one million passengers). Consequently, from the perspective of processing passenger traffic, the Island Airport provides relatively insignificant relief to Pearson in the context of longer-term solutions for the Toronto Region as a whole.

However, if the traffic handled by the commuter airlines at the Island Airport were all to move to Pearson, there might be a certain increase in the demand for runway capacity at Pearson. A significant proportion of the traffic now handled at the Island Airport would be served by flights which currently operate out of Pearson. Where necessary, airlines would use larger aircraft to handle the additional traffic transferred from the Island Airport. However, some traffic would continue to be served using commuter aircraft which would now operate out of Pearson. This type of traffic would consist of routes which did not contain sufficient volume to be economical with jet aircraft. This would impose some additional burden on the runway capacity problems currently experienced by Pearson and may serve to accelerate the time when even more capacity would be required. However, this acceleration is not considered to be very significant, as it would likely be a year or two at most.

With respect to the **General Aviation** traffic handled at the airport, closure of the Island Airport would require this traffic to relocate to another airport in the region (or, for a portion of this traffic, to disappear entirely which may be the case for the flying school). For a substantial portion of the traffic at the Island Airport, the current General Aviation traffic at the Island Airport, Pearson would represent the only viable alternative. For this traffic, the Island Airport does provide relief to Pearson. As shown in Exhibit 2-8, the Island Airport handled approximately 39,000 itinerant General Aviation movements in

1989. This represents approximately 11 percent[3] of the total itinerant movements at Pearson. If the total itinerant General Aviation movements at the Island Airport were to transfer to Pearson, this would represent an increase amounting to approximately four years of growth of total movements at Pearson. This represents a substantial relief on the available runway capacity at Pearson which is provided by the Island Airport. Clearly, this represents an upper bound on the amount of relief that the Island Airport provides, since not all of the current General Aviation movements would be expected to transfer to Pearson (due, for example, to the constraints imposed on General Aviation movements during peak periods). If Pearson were to handle its share of the Island Airport's General Aviation traffic in the event that the Island Airport were to close, then it would require additional runway capacity one or two years sooner than would otherwise be the case.

5.2 Commuter Role With Limited General Aviation Traffic

If commuter traffic were strongly encouraged at the Island Airport, it is conceivable that annual passenger traffic could increase substantially. This growth would come from three sources:

- Overall growth in the demand for service on routes currently served by the Island Airport. This growth in passengers is expected to average about 4 percent per year.
- An increase in the market share captured by the Island Airport on existing routes. City of Toronto residents account for an estimated 30 percent of the Toronto Region's passenger traffic. However, the predicted 1990 market share of the Island Airport on its existing routes is only about 10 to 15 percent. Therefore, the Island Airport's traffic on those routes can be expected to increase significantly if more frequent service is offered.
- The introduction of new routes. In addition to the current service to Ottawa, Montreal, London and an expected reintroduction of service to Newark, service could also be introduced on new routes such as Chicago, Detroit, Windsor or Sudbury. The development of new routes offers substantial potential for increased passenger traffic at the Island Airport. The new routes that could be successfully served by the Island Airport would, however, be limited by such factors as the restriction on the use of jet aircraft and the lack of U.S. pre-clearance facilities.

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[3] *The ratio was higher in earlier years but the traffic which has left the Island Airport before and during 1989 is already being accommodated elsewhere.*

5.3 General Aviation Role With Limited Commuter Traffic

If the Island Airport actively marketed itself as a General Aviation airport, some of the General Aviation aircraft that have left Pearson in the last two years might be interested in using the Island Airport. Some changes in pricing and marketing strategies might be necessary, given that these aircraft operators have chosen not to use the Island Airport to date.

If Buttonville Airport were closed, the demand for services at the Island might increase dramatically. Under those circumstances, the shortage of General Aviation facilities in the Toronto Region would become so significant that substantial increases in airport charges may become possible.

5.4 Combined Commuter and General Aviation

Since 1982, the Island Airport has operated as a combined General Aviation and commuter airport. This combined role is designed to meet the needs of all users, as commuter and General Aviation aircraft are not necessarily incompatible.

There are many advantages to operating as a combined commuter and General Aviation airport. Each segment contributes to the well-being of the airport and the aviation community in its own way.

5.5 Conclusions

On the basis of the above, the Island Airport cannot be expected to play a significant role as a reliever to Pearson whether the latter is constrained or not. This conclusion, of course, could change if the Island Airport were allowed to be developed to its potential (i.e., in a manner which would not be in compliance with the terms of the Agreement) or if other circumstances changed (e.g., Buttonville was closed). The Island Airport does, and will continue to provide relief to other area airports and to airport users themselves.

6. Additional Constraints That Can Be Added To The Agreement

One of the study issues identified in the Terms of Reference addresses whether additional constraints can be added to the Agreement. If any additional constraints are considered for inclusion in a revised Agreement, the three parties to the Agreement should assess how well these additional constraints contribute to the achievement of the objectives of revising the Agreement. That is, for example, if an objective is to improve the safety of airport operations to the airport's neighbouring residents, then additional constraints dealing with the noise exposure of the residents may not be the most appropriate means to accomplish that objective. A more direct means, such as limiting the number of movements of various types of aircraft during various times of the day, might be a more appropriate approach.

The types of additional constraints that could be added to the Agreement are wide-ranging and include the following examples:

- A cap on the number of daily aircraft movements.
- A cap on the number of aircraft movements during a particular portion of each day (e.g., during evening hours, during early morning hours).
- A cap on different types of traffic (e.g., a cap for the maximum number of commuter movements and a different cap on the maximum number of General Aviation movements).
- A cap on the maximum number of passengers that can be processed at the airport.
- A limit on airport hours of operation.
- A tightening of the parameters used in the current NEF noise contour constraints in the Agreement.
- A tightening of the methodology used for developing NEF contours.
- The inclusion of additional noise constraint tests to the NEF methodology employed in the Agreement.
- A limit on the availability of services and infrastructure at the airport (e.g., the number of available parking spaces).
- A limit on the alternative options to providing access to the airport (e.g., preventing the construction of a pedestrian tunnel, limiting the size of any replacement ferries).

- A restriction on airline maintenance operations during certain periods of the day (e.g., noisy maintenance activities during night hours).

Each of these constraints would need to be considered in light of the relative difficulty of its implementation. Accordingly, some of the above constraints may not be worthy of consideration because of impractical implementation.

For example, one may consider whether additional constraints addressing noise exposure can be added to the Agreement. In doing so, one should consider that the most appropriate mechanism would be the measure that best reflects the true causes of psychological or physical annoyance. A discussion of relevant alternatives is presented in Appendix G. As shown there, there is a lack of consensus on that issue which may indicate that there is either no such measure (as various individuals react differently to the various attributes of noise) or that insufficient research has been devoted to that subject. Nonetheless, the Island Airport is way ahead of many other airports in North America, in that at least agreed-upon standards on this issue have been established and are generally accepted by all interested parties.

Specifically, Appendix D presents the detailed findings of our research into eight other airports regarding methodologies employed to control noise impacts. The major findings of this research is that only three of the other eight airports utilize explicit techniques for noise management. These are as follows:

- St. Hubert Airport uses NEF's to limit noise impacts.
- Edmonton Municipal Airport uses a number of rules for this purpose, including a form of NEF contours.
- John Wayne Airport in Orange County, California restricts the numbers and types of aircraft that can use the airport.

7. Development Scenarios and Study Methodologies

Six development scenarios were selected for detailed analysis in this study. Each scenario was selected to provide answers to questions about the various impacts at different volumes and mix of air traffic at the Island Airport. In this chapter, we document the key variables underlying each scenario and present the methodologies used to analyze the various impacts of each scenario.

7.1 The Development Scenarios

The Island Airport currently operates as a combined General Aviation and commuter airport. This mode of operation is thought to be desirable as each segment contributes to the well-being of the airport and the aviation community in its own way. Further, commuter and General Aviation aircraft are not necessarily incompatible at a particular airport. Therefore, all six development scenarios examined for this study entail a combined General Aviation and Commuter role.

It is important to remember that these scenarios were designed solely to provide answers to questions about various impacts at different volumes and mix of air traffic at the Island Airport. They are analytic only and are not intended to represent realistic, reasonable or even potential alternative development strategies.

The six scenarios selected for detailed analysis in this study are described below along the following dimensions:

- The rationale for each scenario.
- The assumptions concerning routes served by commuter airlines.
- The expected level of itinerant General Aviation activity. (For this report, itinerant General Aviation traffic is defined to be all traffic which does not provide a scheduled passenger service and which is not flight training activity).
- The assumed changes to the Agreement, if any.
- The priority given to the various types of air traffic once the maximum noise exposure limits are reached.

1. **Current Trends Scenario**. This scenario highlights the implications of no changes to the current operating strategy of the airport and a continuation of current market trends. In this scenario, air carriers are assumed to serve the same routes as at the end of 1990 (i.e., Montreal, Ottawa, London and Newark, New Jersey) with the Island Airport capturing the same market share of the Toronto Area air passenger traffic as it currently holds. Commuter passenger traffic is assumed to grow at approximately 4 percent per year, which is the forecast growth rate for air passenger traffic in the Toronto Area. Itinerant General Aviation movements are assumed to grow at Transport Canada's forecast average national growth rate of 1.4 percent per year. (One movement is recorded for each landing, take-off or simulated approach). Local movements (i.e., flying school activity) are restricted as noise exposure limits are reached.

2. **Increased Commuter Movements Scenario (without Jet Aircraft) and Unrestricted Itinerant General Aviation Scenario**. This scenario is designed to assess what might happen if the Island Airport were marketed to commuter carriers while still complying with the terms and conditions of the Agreement and not restricting itinerant General Aviation (even if higher commuter traffic levels could be reached). Essentially, the analysis of this scenario identifies at what point the Agreement constrains the airport from following this strategy. In this scenario, it is assumed that the number of scheduled flights on current and new routes will grow to accommodate the estimated potential demand for the Island Airport without expansion or until the maximum noise profile is reached. General Aviation traffic is assumed to grow at the same rate as in Scenario 1 and local movements are restricted as noise exposure limits are reached. If noise exposure limits are still exceeded once all the local traffic has been removed, commuter movements will be restricted so that itinerant General Aviation traffic is unrestricted. (In Scenario 4, this last assumption is reversed.)

3. **Increased Commuter Movements (with Jet Aircraft) and Unrestricted Itinerant General Aviation Scenario**. This scenario is designed to illuminate the effects of allowing commuter airlines to operate quiet jets at the Island Airport while still complying with all other terms and conditions of the Agreement. This scenario is an extension of Scenario 2 wherein scheduled commuter carriers are allowed to operate as "quiet jets" at the Island Airport.

4. **Increased Commuter Movements (without Jet Aircraft) and Restricted Itinerant General Aviation Scenario**. This scenario is designed to assess the impact of allowing commuter movements to grow unrestrained while restricting itinerant General Aviation traffic as noise exposure limits are reached. In this scenario, commuter traffic is allowed

to increase to accommodate the estimated potential demand for the Island Airport without expansion as in Scenario 2. However, if the maximum noise exposure profile constrains the commuter traffic activity in the future, then the itinerant General Aviation traffic is assumed to be limited to make room for further growth in commuter traffic (e.g., through operating restrictions).

5. **Break-even Itinerant General Aviation Scenario.** This scenario is designed to assess whether the Island Airport can achieve financial self-sufficiency while still complying with the conditions of the Agreement (for example, the maximum noise exposure profiles outlined in the Agreement). This scenario is an extension of Scenario 1. If the Island Airport is not expected to be financially viable in Scenario 1, then the airport is assumed to market its services successfully to the General Aviation community in order to increase General Aviation traffic to the airport to break even financially with no change in pricing strategy. Commuter activity is assumed to continue at the same level as in Scenario 1.

6. **Maximum General Aviation Scenario.** This scenario was examined to determine whether the airport could be financially viable as a General Aviation-only airport, assuming that no commuter traffic was permitted. Services and facilities at the Island Airport are assumed to be promoted to encourage the maximum possible itinerant General Aviation activity at the Island Airport while still complying with the terms and conditions of the Agreement. This scenario may be considered to represent the circumstances if Buttonville were to close. A sensitivity analysis was performed for this scenario in which we calculated the minimum commuter traffic which was required to use the Island Airport in addition to the higher level of General Aviation traffic in order to break even financially. We then tested this sensitivity to determine whether the maximum noise exposure limits were exceeded at that level of traffic.

In the conduct of the analyses it was found that Scenarios 4 and 5 above are redundant. Specifically:

- Scenario 2 was designed to highlight the impacts of marketing the Island Airport to commuter carriers. When the development scenarios were selected for study, it was uncertain when the noise exposure limits would be reached if itinerant General Aviation traffic were allowed to grow unconstrained as the commuter traffic grew. Therefore, a second scenario was selected, Scenario 4, which would highlight how severe the limits on itinerant General Aviation traffic would have to be to allow unconstrained growth of commuter traffic. However, since the noise exposure limits were not exceeded (once local movements were restricted) and, consequently, no restrictions were required on

either commuter or itinerant General Aviation traffic in Scenario 2, there was no need to analyze Scenario 4. That is, the analysis of Scenario 2 is the same as the analysis of Scenario 4.

- Scenario 1 was designed to highlight the impacts of allowing operations to continue according to general trends underlying current activity at the Island Airport. At the time the development scenarios were selected, it was uncertain whether the airport would be financially viable under Scenario 1. Therefore, a second scenario, Scenario 5, was selected which was designed to assess how much additional General Aviation traffic would be required above the levels forecast in Scenario 1 to make the airport financially viable. When the analysis of Scenario 1 showed that the airport was expected to be financially viable in all years without increased General Aviation activity, there was no need to continue with the analysis of Scenario 5.

Consequently, Scenarios 4 and 5 are not discussed in this report.

In the remainder of this chapter, we describe the methodologies which are employed for the analysis of the remaining four scenarios. The results of the analyses are presented in subsequent chapters, as follows:

- Chapter 8 presents the results of the analysis of Scenario 1 — The Current Trends Scenario.
- Chapter 9 presents the results of the Scenarios 2 and 3 — The Commuter Scenarios.
- Chapter 10 presents the results of Scenario 6 — The General Aviation Scenario.

7.2 Study Methodologies

In this section, we describe the methodologies which have been used to conduct the analyses in this study. Since not all the study issues were subjected to detailed quantitative analyses, they are not dealt with in this section. The issues which were not quantified in the conduct of this study are:

- Safety.
- Economic impacts.
- Other environmental impacts or issues.
- Quality of life.
- Wildlife.

7.2.1 Demand Forecasts

As a starting point for each scenario, we first developed an unconstrained demand forecast for commuter services and for General Aviation movements. Each of these forecasts is discussed below.

Commuter Passenger and Aircraft Movement Forecasts

In developing a demand forecast for annual passenger traffic at the Island Airport, we estimated the potential market share on each route which could be served by the Island Airport. As part of this analysis, we examined the historical relationships among:

- The supply of seats on each route.
- The utilization of aircraft on each route (average load factor).
- The actual market share of origin and destination traffic attracted to the Island Airport on each route. The estimated potential market share on any route was assumed to grow at the rate of overall air passenger growth for the Toronto Region.

To estimate the supply of seats on each route, we constructed a "typical day" schedule for the Island Airport based on City Express's July 1990 schedule and Air Ontario's October 1990 schedule (including the increase in service in October 1990). This typical day schedule was adjusted to reflect the assumption that, as noise limits were reached, commuter traffic would be limited to operating between the hours of 7:00 a.m. and 10:00 p.m. (as opposed to the airport operating hours between 6:30 a.m. and 11:30 p.m.).

The average load factor for the two airlines was estimated by dividing the available seats by the total passenger traffic at the Island Airport during the months in which Air Ontario was reasonably well established and City Express was still operating a full schedule. We assumed that each route operated at more or less the same load factor.

For the three major routes (Ottawa, Montreal and Newark), we researched Transport Canada statistics on origin and destination traffic on these routes (adjusted to reflect estimated traffic of small non-reporting carriers) and derived a market share assumption on each route for Island Airport airlines.

We repeated the same exercise of estimating the supply of seats, average load factors and market share for 1987 when City Express reached its peak level of passenger traffic. In both the 1987 and the 1990 analysis, market shares for the Island Airport were found to vary with distance flown. The time penalty associated with the turboprop aircraft appears to materially dampen demand at greater distances.

In the first year of the forecast (1992), we have assumed that the supply of seats will be adequate to capture the maximum market share that the Island Airport can expect to achieve on each of the three major routes.

We have further assumed that in Scenario 1, airlines will be allowed to add new flights to existing routes as demand increases, but that no new routes will be approved. Passenger traffic was assumed to grow at the forecast passenger growth rate for the Toronto Region, i.e., approximately 4 percent per year from 1992 to 2010. This growth rate reflects our own statistical analysis of historical passenger traffic in the Toronto Region and is essentially the same as the official comparable Transport Canada forecast.

The first year of passenger (and aircraft movement) forecasts is 1992. We have not provided a forecast for 1991 since the Island Airport is in a state of rapid change (including the introduction of service by Air Ontario and the expected introduction of service by other airlines). We assume that the full effects of these changes will be evidenced by the end of 1991. It is important to note that these forecasts are long term in nature and are not intended to reflect short term impacts on passenger traffic such as the recent closure of City Express.

The methodology used in Scenario 2 is essentially the same as for Scenario 1 with the following additions to estimate potential market share on new routes:

- We first estimated the maximum distance at which turboprop commuter service would be competitive based on time penalties due to the slower airspeed of turboprops. This distance was estimated to be 450 statute miles.
- It was assumed that the relationships determined in the analysis for Scenario 1 between length of flight and potential market share for the Island Airport were the same for new routes. Specifically, if any market share has been lost on existing routes due to the particular circumstances of the Island Airport (e.g., the "psychological" barrier of the presence of the ferry), this loss of passengers is assumed to apply to new routes and has been implicitly incorporated in the market share assumptions for these routes.
- Origin and destination statistics (with adjustments for non-reporting air carriers) for all cities within a radius of 800 km of Toronto were examined to determine if there was adequate demand to support commuter service at any time during the forecast period.
- New routes were assumed to be served by a small twin-engine turboprop (similar to a de Havilland Twin Otter, the SAAB, the Embraer 110, or the Beechcraft 1900) until the traffic could support the operation of Dash 8s.
- The feasibility of new routes to the United States was examined in the context of the availability of U.S. customs at the destination airport since, as discussed

in Section 4.6, it is unlikely that the Island Airport will have preclearance facilities in the study horizon.

The methodology used in Scenario 3 is essentially the same as for Scenarios 1 and 2 with the following additions:

- Once the estimated market share on any route is forecast to be high enough to support the operation of a 50 seat aircraft, it is assumed that the route would be serviced by jet aircraft. For this scenario, we assumed that the BAe146 would be used to provide this service.
- Once jets are introduced on a route, the expected market share for that route would be revised to reflect the disappearance of the time penalty associated with flying from the Island Airport by turboprop.

General Aviation Movement Forecasts

We assumed that General Aviation movements (itinerant and local) will grow at an annual rate of 1.4 percent from their expected 1990 level. That growth rate is consistent with Transport Canada's current (1990) forecast of growth for Canada's top eight cities. The base traffic for both itinerant and local movements at the Island in 1990 was estimated for the full year of 1990 on the basis of the 1990 year to date traffic provided by the airport management.

Accordingly, the itinerant movements were projected to be 22.6 percent higher than in 1989, i.e., 63,000 (in rounded terms). It should be noted that 1989 was an exceptionally poor year and that the 63,000 movements are close to the levels experienced in the 1981-1985 period.

Similarly, local movements (e.g., flying school activity) were projected to reach 59,000 in 1990: approximately one-half of the 1981-1985 average.

As part of the analysis of noise impacts (discussed in Section 7.2.2), we studied the itinerant General Aviation movements on the seven busiest days of the three busiest months of 1989. The average movements of these 21 days is called the peak planning day forecast. To translate annual forecasts of itinerant and local General Aviation movements to peak planning day forecasts, we assumed that the ratio between these two parameters that was experienced in 1989 will apply throughout the planning horizon.

Limits on Activity Forecasts

Once an unconstrained demand forecast was developed for each scenario, we assessed the impact of that forecast on the noise exposure forecast, the road system, car parking facilities, the ferry and other airside facilities at five year intervals (i.e. for 1992, 1997, 2002 and 2007).

When the maximum noise exposure was exceeded in any scenario, local General Aviation traffic was assumed to be curtailed by the THC until the noise exposure was once again within the specified limits. Local traffic was allocated to the lowest priority at the Island Airport for the purposes of this study simply because local traffic generates very little income for the airport, relative to itinerant General Aviation and commuter traffic, and contributes materially to the overall noise impact. We have assumed that local traffic would probably decrease without any action by the airport management as the Island Airport becomes busier with itinerant General Aviation and commuter traffic. This is based on the view that the flying school students would prefer a less busy airport for their flight training. If local movements do not decrease, airport management could implement pricing or operating strategies which would discourage the use of the Island Airport for flight training in order to comply with the noise constraint provisions of the Agreement.

If the noise profile still exceeded specified limits once all of the local traffic is removed, either commuter traffic or itinerant General Aviation traffic would be restricted, depending on the scenario description.

If any of the other factors became potential capacity bottlenecks, a decision was made to either upgrade the service (e.g., replace the existing ferry with a larger ferry) or to cap activity at that level. The demand forecasts were then revised until no physical or legal limits were violated. The assumptions specific to each scenario are detailed in Chapters 8 through 10.

We have assumed, based on our research, that in all scenarios the airside facilities (e.g., hangar space, maintenance facilities, etc.) are adequate for the forecast demand.

7.2.2 Noise Levels

An explanation of the use of NEF contours as noise measures is provided in Section 4.1.

In the preparation of the noise contours in this study, we have endeavoured to employ the same methodology used by Transport Canada in analyzing compliance with the Agreement. Accordingly, we accessed the Transport Canada methodology and the data that Transport Canada are using to prepare the actual NEF contours for the Island Airport for 1989.

Transport Canada's report for 1989 is expected to be available in May 1991, shortly after this report is finalized. The NEF contours we have developed for that year are expected to be identical to Transport Canada's contours.

In conducting the analysis of the 1989 Island Airport NEF contours, we prepared an average distribution of General Aviation aircraft by aircraft type and time of day for the seven busiest days of the three busiest months of 1989. The average of these 21 days is called the peak planning day and is used in the calculation of the NEF contours. The

distribution of peak planning day General Aviation aircraft for 1989 was used in the production of NEF contours for the forecast period.

As noted earlier, Dash 8 aircraft are allowed to operate at the Island Airport on the condition that the pilots reduce the RPMs on take-off to minimize the noise impact (See Section 3.3.2). Accordingly, the noise generated by the Dash 8 must be comparable to the noise of the quieter Dash 7. We used that assumption in our noise forecasts.

We also prepared forecasts for a variety of scenarios in order to understand the key factors contributing to the noise profile. These scenarios assume levels of activity in which:

- Only General Aviation aircraft are allowed to use the Island Airport while the mix of aircraft and the distribution of these flights over the day is the same as during the three busiest months in 1989,
- Only Dash 8-type commuter aircraft are allowed to use the Island Airport and are limited to operating between the hours of 7:00 a.m. and 10:00 p.m.
- Only the BAe146 is allowed to use the Island Airport and are limited to operating between the hours of 7:00 a.m. and 10:00 p.m.

Noise impacts were assessed at five year intervals (i.e. 1992, 1997, 2002 and 2007). If the actual 28 NEF exceeded the specified limits in any given year, local traffic was reduced (as discussed in Section 7.2.1) until the level of activity generated an acceptable noise level. Local movements were then reduced in each subsequent year to accommodate growth in other traffic segments.

7.2.3 Air Quality

The state of the air quality in the vicinity of the Island Airport has been addressed with reference to monitoring data compiled by the Ontario Ministry of the Environment (MOE). The closest monitoring stations are at Fort York and the CN Tower. The criteria used for assessing air quality are those established by the MOE for the protection of human health, vegetation, animals and materials against adverse effects due to common air pollutants.

The different scenarios for possible future operations of the airport were compared using projected peak planning day aircraft movements developed as discussed in Section 7.2.1 and aircraft emission factors developed by the International Civil Aviation Organization (ICAO) and the U.S. Environmental Protection Agency (EPA). For each scenario, the number of movements of a given a aircraft type was multiplied by the emission factors for that aircraft during the landing and take-off (LTO) cycle. These emission factors are shown in Exhibit 7-1. Emission factors were used for HC, CO and NOx, expressed as kilograms of pollutant per LTO cycle. By summing the emissions over the various aircraft types, the total daily emissions of HC, CO and NOx were estimated.

Exhibit 7-1
Emission factors by aircraft type

Aircraft Type	Engine Code	Engine Type	Emissions (kg/LTO) HC	CO	NO_x
Commuter					
Twin Otter	2xPT6	Turboprop	2.30	3.25	0.37
Dash 8	2xPW120	Turboprop	10.17	16.45	0.42
BAe146	4xALF502	Jet	2.43	14.63	8.33
Itinerant General Aviation					
Cessna Citation	2xJT15D	Jet	3.05	8.85	0.91
Cessna Conquest II	2xTPE331	Turboprop	3.48	2.84	0.53
Beech Baron 58P	2xCont	Piston	0.52	15.01	0.06
Cessna 150, 172, etc.	1xCont/Lyc	Piston	0.10	3.77	0.01
Local					
Single-engine piston	1xCont/Lyc	Piston	0.10	3.77	0.01
Twin-engine piston	2xCont	Piston	0.52	15.01	0.06

Projected emissions due to aircraft operations were compared with emissions from a representative mix of vehicles using the Gardiner Expressway. Expressway emissions were calculated from emission factors (kilograms per kilometre travelled) published by the EPA and vehicle traffic volumes provided by Metro Toronto Traffic Department.

7.2.4 Road Traffic

Traffic operations are assessed on the basis of the level of service offered during the average weekday morning and afternoon roadway peak hour intersection capacity and geometric configuration.

Manual traffic counts were undertaken on Thursday, July 19, 1990 during the morning (6:30 a.m. to 9:30 a.m.) and afternoon (3:30 p.m. to 7:30 p.m.) weekday roadway peak hours at the Bathurst/Queen's Quay intersection. The month of July is not considered to be a typical business travellers period; however, leisure/vacation commuting increases during the summer months from the airport. Therefore, traffic volumes were considered to represent typical peak hour volumes at the Bathurst/Lakeshore and Bathurst/Queen's Quay intersections. This traffic survey was undertaken on a typical or average day prior to the opening of the Canadian National Exhibition and when no events were scheduled at the SkyDome, in order to ensure that representative traffic volumes were recorded and not traffic resulting from special events. Peak hour intersection counts for the Bathurst/Lakeshore intersection were obtained from the Metropolitan Toronto Transportation Department.

Existing traffic conditions at these key intersections were assessed for the morning and afternoon roadway peak hours on an average day for the airport since peak hour roadway operations are more critical mid-week than on the peak weekday (i.e., Friday) or weekend when airport operations result in the heaviest passenger traffic. A Level of Service "A" generally represents conditions of free flow, characterized by low volumes and high speeds. There is little or no restriction in maneuverability due to the presence of other vehicles and drivers can maintain their desired speeds with little or no delay. Conversely, a Level of Service "F" is represented by intersection operations at low speeds, where demand exceeds capacity. Speeds are reduced substantially and vehicular stoppages may occur for periods of time. This is usually characterized by extended vehicular congestion.

The Bathurst/Lakeshore intersection is currently operating at a very good Level of Service "B" (Volume/Capacity = 0.62) during the morning roadway peak hour and at a Level of Service "A" (V/C = 0.47) during the afternoon roadway peak hour. The Bathurst/Queen's Quay intersection is currently operating at an excellent Level of Service "A" during both the morning (V/C = 0.58) and afternoon (V/C = 0.57) roadway peak hours.

Critical movements for the existing morning peak hour operations at the Bathurst/Lakeshore intersection were the eastbound left-turn movement (V/C = 0.56) and

the southbound through-left turn movement (V/C = 0.73). The critical movements during the afternoon peak hour at this intersection were the westbound right-through-left movement (V/C = 0.60) and the southbound through-left turn movement (V/C = 0.55). Similarly, for the Bathurst/Queen's Quay intersection, the critical movements for the morning peak hour were the eastbound right-through-left movement (V/C = 0.60) and the southbound left-turn movement (V/C = 0.63). During the peak hour, the critical movements were the southbound left-turn movements (V/C = 0.64) and the eastbound right-through-left movements (V/C = 0.52).

The traffic assessment is based upon the existing background traffic only using the ultimate horizon year of 2010. No historical increases were applied to the existing background roadway traffic. Site traffic from planned major developments in the vicinity of the airport (i.e., Molson's, IPCF lands, CN Lands, etc.) was not included in the background traffic because the intent of this transportation assessment was to determine the change in traffic and boundary road network operations due to the impact of increases in airport-generated traffic only. The impact of these potential redevelopments on the boundary road system is uncertain and has not been incorporated into the analysis.

Several of the issues that were considered in the traffic assessment include:

- Will the boundary roadway system have enough residual capacity to accommodate the increase in airport-generated traffic under the horizon year 2010?
- Are roadway and/or intersection improvements needed in order to accommodate this traffic?

Note that the analysis of road traffic (as well as the analysis of car parking and ferry access), is based on the assumption that travel habits of airline passengers, General Aviation users and employees do not change. In reality, there could be a change in the habits due to external forces (e.g., more people take the shuttle bus from Union Station to avoid excessive traffic as intersections around the airport become congested) or due to management policies. Travel habits could be influenced by:

- Pricing policies (e.g., higher rates for parking may encourage the use of public transit).
- Limits on the supply of a service (e.g., restricting the number of parking spaces to encourage the use of taxis, airline business or public transit).
- Limits on other facilities (e.g., closing the terminal buildings on the Island would force passengers to check in either at Union Station or any other check-in facility on the mainland).

In the analysis of road traffic (as well as the analysis of car parking and ferry access), we have assumed that demand increases proportionately with commuter passengers. The total

demand actually comprises commuter passengers, General Aviation users, visitors and employees. We have assumed that the major source of demand is from commuter passengers and that demand from other users will grow proportionately with the growth in commuter passengers over the long term.

In our analysis, we have not incorporated any change in travel habits of airline passengers which might occur due to the proposed expansion of the Harbourfront Light Rapid Transit (HLRT). It is not expected that such a service would be preferable to the airline courtesy shuttle buses currently provided from downtown for the following reasons:

- Once you are on the shuttle bus, you are guaranteed to make the flight.
- The shuttle bus takes you right to the Island Airport.
- The shuttle service is free for ticketed passengers.

7.2.5 Car Parking

A parking utilization and demand survey was undertaken on Thursday, July 19, 1990 from 6:00 a.m. to 11:00 p.m. on an average weekday in order to determine the existing parking requirements for the airport. The total number of vehicles parked in the lot was recorded each half-hour over the duration of the day in order to identify the time period in which the peak parking demand occurred. Results of this survey are shown in Exhibit 7-2.

A parking assessment was then undertaken to determine the future parking requirements for increases in airport-generated traffic associated with each of the various assessment scenarios.

The peak hour demand of an average weekday was used in this assessment to determine the parking capacity requirements since using the demand of the peak hour of the peak day would result in excess parking supply being provided, which would be uneconomic.

As mentioned in Section 7.2.4, the analysis of car parking impacts is based on the assumption that travel habits do not change. We also assume that demand for car parking increases proportionately with commuter passenger traffic in the long term.

7.2.6 Ferry Access

A survey of ferry usage was undertaken on Thursday, July 19, 1990 between the hours of 6:00 a.m. and 11:00 p.m. At this time City Express was still offering service to Ottawa, Montreal and Newark and Air Ontario was well established. (The results of this survey are presented in Exhibit 7-3). The ferry survey was undertaken on this day since a Thursday is representative of typical weekday conditions. In addition, this day was selected so that the

Exhibit 7-2
Existing parking utilization (Survey Results)

Half hour period beginning:	Number of cars parked	Percent (%) utilization
6:00	28	23
6:30	43	35
7:00	49	40
7:30	56	45
8:00	68	55
8:30	67	54
9:00	68	55
9:30	72	58
10:00	77	62
10:30	67	54
11:00	83	67
11:30	87	70
12:00	89	72
12:30	**91**	**73**
13:00	90	73
13:30	90	73
14:00	89	72
14:30	86	69
15:00	88	71
15:30	88	71
16:00	85	69
16:30	85	69
17:00	80	65
17:30	74	60
18:00	73	59
18:30	69	56
19:00	74	60
19:30	67	54
20:00	62	50
20:30	60	48
21:00	63	51
21:30	57	46
22:00	52	42
22:30	37	30
23:00	33	27

Exhibit 7-3
Mode of passengers using ferry

	Mode	Embarking (%)	Disembarking (%)
1.	By foot:		
	- Park and walk-on	55	55
	- From taxi	11	5
	- Drop-off from car	3	1
	- Total by foot	69	61
2.	By Airline Bus	21	29
3.	By Car	9	9
4.	By Truck	1	1
	Total	100	100

ferry survey could be correlated with both the parking survey and the traffic count surveys which occurred on the same day.

Based on discussions with the ferry operator, it was determined that the peak weekday for ferry operations is Friday. Information obtained from existing enplaning and deplaning statistics for both a typical weekday and the peak weekday allowed a determination of a "peak weekday/typical weekday" factor. This factor was then applied to the information obtained from the ferry surveys to determine the demand that occurs under peak weekday (i.e., Friday) conditions.

For each ferry crossing, the following information was gathered:

- The number of foot passengers embarking/disembarking.
- The number of cars embarking/disembarking.
- The number of people inside each car.
- The number of trucks embarking/disembarking.
- The number of people inside each truck.
- The number of airline buses embarking/disembarking.
- The number of people in each airline bus.

Peak hour ferry demand for existing conditions was determined from the survey information for both a typical day and the peak weekday. For each of the future airport scenarios, the ferry demand was determined based on the projected increase in air passenger traffic. It was then determined if there would be sufficient ferry-carrying capacity for the projected increase in commuter passengers and if not, when capacity would be reached.

For the purposes of this report, we have made the following assumptions about access to the Island Airport:

- For each scenario, in the year in which demand is expected to exceed current capacity, the existing ferry will be replaced by a larger ferry, operating from larger docks.
- The funding for the ferry is assumed to be provided partly by the THC from a capital replacement reserve fund taken from Island Airport revenues, partly by a provincial subsidy and partly financed from subsequent operations, using airport operating surpluses.

As mentioned in Section 7.2.4, the analysis of ferry impacts is based on the assumption that travel habits do not change. We also assume that demand for car parking increases proportionately with commuter passenger traffic in the long term.

7.2.7 Passenger Processing

Our analysis of the passenger processing function focused on whether the current facilities (i.e., the existing airport terminal building, the new "temporary" terminal building and the customs building) would be large enough to accommodate the forecast level of activity in each scenario. This space analysis is preliminary and is intended only to provide an insight into the potential need for new facilities during the study horizon.

The Federal Aviation Administration (FAA) in the United States provides a methodology for calculating an appropriate terminal building size based on the number of annual passengers expected to use the terminal. Such an estimate includes an allowance for all services and facilities which are generally located in an airport terminal building (e.g., check-in areas, queuing space, security, holding lounges, crew rooms, airline and government offices, customs and immigration inspection areas, restaurants and concessions).

Based on the FAA methodology for a "typical international airport" (i.e., an airport with a requirement for customs and immigration facilities), we estimated the terminal size which would be required, according to this methodology, to handle the current passenger traffic levels of approximately 300,000 per year. This analysis suggested that a terminal building of approximately 3,630 square metres would be required to adequately handle this level of traffic. However, the current facilities total just under 1,200 square metres (approximately one-third of the space required by a "typical" terminal building). Further, it is estimated that the current facilities could potentially handle up to 400,000 annual passengers without severely compromising service levels (which implies a requirement of approximately one-quarter of the space required by a "typical" terminal building).

The reason for the lower space requirements at the Island Airport include the following:

- Two-thirds of the enplaning passengers use the downtown check-in facilities. These passengers only need security clearance and no other processing on the Island.
- Due to the large percentage of business travellers, passengers at the Island Airport are less likely to be accompanied by well-wishers or met by family and friends. Space for such non-passengers is included in "typical" space estimates for air terminal buildings.
- Business passengers generally have less luggage to check.
- There are only minimal commercial concessions (i.e., no shops or restaurants) in the terminals.

In addition, the requirement for airline offices has been low relative to other airports since City Express maintained its offices on the mainland.

Even if the Island Airport requires only one-quarter of the area of a "typical" terminal building (as this analysis suggests), service levels may be compromised at a volume of about 400,000 annual passengers. Although it is possible that the current facilities could physically handle more than 400,000 annual passengers, it is likely that travellers, who are accustomed to a certain level of service at international airports, will lack certain conveniences and services, especially during the peak periods. The continued provision of existing service levels can only be achieved through the expansion of the current facilities if the passenger traffic levels projected in three of the four development scenarios are achieved.

7.2.8 Financial Viability

Definition of Financial Viability

The financial viability of the Island Airport was assessed using a computerized model to project cashflows associated with the operation of the Island Airport. In developing the computer model, consideration was devoted as to what is to be included in the assessment of financial viability. For the purpose of this report, we have considered the Island Airport to be financially viable only if it generates sufficient cash flow to meet annual operating obligations and to provide a reserve for future repairs and major capital expenditures required to maintain the existing capital assets over the long term.

As discussed in Section 4.12.1, ferry and parking operations are outside the scope of our definition of financial viability. Further, the following capital items have been excluded from the financial analysis:

- A new terminal building.
- Expenditures for Air Navigation Services and Air Traffic Services.
- Return on land and capital assets.

Estimate of Revenues and Expenses

The starting point for this analysis was to review the Island Airport's detailed budget for 1990, provided to us by the Toronto Harbour Commissioners. Each operating cost listed in the budget was classified as either fixed or variable. Fixed costs do not vary with the level of activity at the airport and are assumed to rise at the rate of general price inflation in the economy. Variable costs were further analyzed to determine the relation between the cost and activity at the airport. We found that variable costs are generally correlated with one of the following demand parameters:

- The level of commuter passengers.

- The number of commuter movements.

The major expense categories at the Island Airport are:

- Salaries and benefits.
- Security.
- Repair and maintenance.
- Utilities.

We have added two reserve funds to the cash flow analysis. The first is a reserve for minor capital requirements to provide for minor repairs of buildings, etc. The contribution to this reserve is considered part of the operating budget.

The second is a reserve for major capital expenditures such as the resurfacing of the runways, repairs to the hangars, etc. The contribution to this reserve has been estimated to be 15 percent of annual operating revenues (including passenger user fees). The contribution to the second reserve is made only if funds are available after all other operating obligations are met (i.e., if the Island Airport is operating at a deficit, no contribution is made to this reserve).

By including a reserve for major capital expenditures, we do not intend to suggest that such a reserve should be established. In fact, there are other financial arrangements which are in place to provide funds for future capital expenses (e.g., Transport Canada is obliged to provide funding for certain capital expenditures). However, in order to highlight whether the Island Airport is financially self-sufficient, we have used this reserve in the financial analysis to reflect the fundamental economics of the airport's operations and not necessarily the reality of expected subsidies.

Similarly, the Transport Canada operating subsidy has not been included in the assessment of financial viability for the purposes of this report. This exclusion was also made to highlight whether the Island Airport is self-sufficient from a financial perspective.

As with expenses, revenues were sorted as either fixed or variable depending on the nature of the revenue. The major sources of revenue for the Island Airport are:

- Passenger user charges.
- Land and building rentals.
- Landing fees.
- Fuel tax.
- Aircraft parking charges.

Future revenues and expenses were projected to the year 2010. All fixed revenues and expenses were assumed to grow at the rate of inflation, which was assumed to be 5 percent per annum. All variable revenues and expenses were assumed to grow with the appropriate type of activity and with the rate of inflation.

The fees and charges schedule for the Island Airport for 1990 was also provided to us. We assumed that there would be no changes in the pricing strategy underlying these fees and charges except for the increase in the passenger user fee on January 1, 1991 from $1.50 to $3.00 per enplaned and deplaned passenger.

The Annual Surplus or Deficit

Based on the projection of revenues and expenses, we derived an annual operating surplus or deficit. Note that this surplus or deficit is after the contribution to the reserve for major capital expenditures. However, no contribution is made to the reserve if the Island Airport is operating at a deficit before the contribution.

If the Island Airport is operating at a surplus after the contribution to the reserve, the surplus is shared between Transport Canada and the THC. Transport Canada's share is contributed to a reserve for the funding of future operating deficits and capital expenditures for the Island Airport. In our analysis, we assume that any funds in this account could potentially be used to fund expenditures which have been excluded from the assessment of financial viability (e.g., a new terminal building). The THC's share is available for its own use and is not earmarked for the airport.

8. Current Trends Scenario

In Chapters 8, 9 and 10, we present the detailed analysis of the four development scenarios. Each chapter provides the following information:

- The key parameters of each scenario (including activity forecasts).
- The impacts under each scenario (i.e., noise levels, air quality, road traffic, car parking and ferry access).
- An assessment of the financial viability of the airport under each scenario.
- A summary of the key conclusions drawn from the results of the analysis described in the chapter.

In this chapter, we present the results of our analysis of Scenario 1, the Current Trends Scenario. The methodologies used to analyze the various impacts are presented in Chapter 7 and are not repeated in this and the following chapters.

The results are presented in more detail in this chapter than in Chapters 9 and 10 as many of the results do not change materially from one scenario to another.

8.1 Key Parameters

These are the key parameters of the Current Trends scenario:

- The commuter service offered at the Island Airport is limited to the level of service (i.e., currently serviced routes) offered by Air Ontario as of October, 1990 and by City Express before its operations were reduced in August, 1990.
- The pricing strategy for services at the Island Airport (e.g., landing fees and passenger user fees) does not change materially from the 1990 levels (other than adjustments for inflation) except for the increase in the passenger user fees on January 1, 1991.

Activity forecasts for annual commuter passenger traffic and peak planning day aircraft movements for Scenario 1 are shown in Exhibits 8-1 and 8-2. As shown in Exhibit 8-1, annual enplaned and deplaned passengers are projected to be 1.04 million by the year 2010. Note that in Exhibit 8-2 total peak day commuter movements do not increase until after the year 2002. This apparent lack of growth in movements reflects the fact that the airlines serving the Island Airport are expected to provide more seats than absolutely necessary to

Exhibit 8-1
Scenario 1 - Current Trends

Annual Enplaned/Deplaned Passengers
Toronto Island Airport

Year	Passengers (000's)
1992	510
1993	530
1994	553
1995	576
1996	600
1997	625
1998	651
1999	677
2000	704
2001	732
2002	761
2003	792
2004	824
2005	857
2006	891
2007	927
2008	964
2009	1,003
2010	1,044

Exhibit 8-2
Scenario 1 - Current Trends

Peak Planning Day Movements

	1992	1997	2002	2007
Commuter				
Dash 8	90	90	90	94
Total Commuter	90	90	90	94
Itinerant General Aviation				
Cessna Citation	2	3	3	3
Cessna Conquest II	29	31	33	36
Beech Baron 58P	47	50	54	58
Cessna 150, 172, etc.	187	200	215	230
Total Itinerant General Aviation	265	284	304	326
Local Movements				
Single-engine piston	278	298	288	223
Twin-engine piston	49	53	51	39
Total Local Movements	327	351	339	262
Total Movements	682	725	733	682

Note: Totals may not add due to rounding.

meet current demand in order to stimulate traffic by offering frequent service, resulting in low load factors. (The load factor is the ratio between passengers and available seats.) As the Island Airport matures as a commuter airport, it is expected that the airlines will achieve higher load factors and, therefore, will absorb passenger traffic growth with the existing number of flights.

It is important to note that these forecasts are long term in nature and are not intended to reflect short term impacts on passenger traffic such as the recent closure of City Express.

8.2 Impacts under Scenario 1

8.2.1 Noise Levels

Our study provided several noteworthy results:

- The noise contour map attached to the Agreement was prepared in 1978, when the airport was used primarily for General Aviation. The maximum noise exposure contours were established on the basis of a traffic profile that differs greatly from the traffic profile of the Island Airport today. Hence the shapes of today's contours are different. For example, Exhibit 8-3, shows the official 25 NEF contour and the forecast 28 NEF contour for 1992. Note that the 1992 contour is longer and narrower than the official contour.

- The contours of General Aviation activities are markedly different from those of Dash 8 activity as shown in Exhibit 8-4.

  It follows that while the contour of the Dash 8s extends farther to the east and west than the General Aviation contour, it is narrower. Thus, the noise impact along the shoreline and the residences on the islands would actually be lower if only Dash 8s were allowed to operate at the Island Airport than if only General Aviation aircraft were allowed, each operating at the maximum level of activity allowed by the noise standards of the Agreement.

- The noise contour of the Dash 8 activity shows that at 175 daily flights, the Agreement would be violated, i.e., the 25 NEF contour of the Agreement is exceeded to the east of the airport by the 28 NEF contour caused by the flights.

Our analysis shows that under the traffic assumptions for this scenario, the noise limits as specified in the Agreement are not expected to be exceeded in the study horizon if local movements are phased out beginning in the year 2000.

The noise exposure at the 28 NEF contour is roughly equivalent to an average hourly noise level of 60 decibels. The ambient 24 hour noise level generated by the Gardiner

Exhibit 8-3
Comparison of the Shape of the Official Noise Contour and the Forecast 1992 Noise Contour

OFFICIAL 1990 NEF CONTOUR
(25 NEF)

SCENARIO 1, 1992 FORECAST NEF CONTOUR
(28 NEF)

Exhibit 8-4
Comparison of the Shape of a Dash 8 Noise Contour and a General Aviation Noise Contour

SAMPLE NEF CONTOUR
FOR 175 DASH 8 MOVEMENTS
(28 NEF)

SAMPLE NEF CONTOUR
FOR 600 ITINERANT GENERAL AVIATION MOVEMENTS
(28 NEF)

Expressway is estimated to be roughly 80 decibels at a distance of approximately 30 metres from the Expressway. (This estimate is based on traffic volumes provided by the Metropolitan Toronto Traffic Department and the noise modelling software used by the Ministry of the Environment.) Since decibel ratings are on a logarithmic scale, an increase of 10 decibels is equivalent to a ten-fold increase in noise. Therefore, a 20 decibel increase is equivalent to a hundred-fold increase in noise. Thus, in residential buildings located 30 metres away from the Gardiner Expressway, it is likely that the ambient noise from the Expressway would drown out noise generated by activity at the airport.

8.2.2 Air Quality

Air quality is monitored on a routine basis in the City of Toronto by the Ministry of the Environment. This includes monitoring for HC, CO, NO, NO_2, SO_2, SP and O_3. Pollutant levels are compared with standards for desirable air quality established by the MOE to ensure that recorded levels of air pollutants are low enough to protect public health, sensitive vegetation, animals and materials against adverse effects. Levels which occasionally exceed the criteria may be acceptable, but persistently high levels would be a cause for concern.

Results of 1988 (the last year for which published data are available) indicate that, in the area of the Island Airport, air quality is well within the desirable range, with the possible exception of SP (the 24-hour criterion was exceeded 33 times in 1988 and the annual average level was 8% above the annual criterion at Fort York monitoring station). However, it should be noted that high levels of SP were most likely caused by very localized dust sources in the immediate vicinity of the Fort York monitoring station, such as roadways, constructions activity and unpaved areas. High levels of O_3 were caused by region-wide conditions.

From the above information, there appears to be no evidence to suggest that emissions from operations at the Island Airport during the planning horizon will result in undesirable air quality in the airport vicinity. Furthermore, at this time there is no apparent need to place constraints on local emissions, including airport emissions, due to undesirable air quality conditions.

Traffic on the Gardiner Expressway represents a major source of air pollutants, including HC, CO and NO_x. The quantities emitted depend on several factors, such as the number of vehicles using the road, their average speed, engine operating conditions and the ambient temperature. Assuming an average traffic volume of 6,000 vehicles per hour (from September 1989 traffic counts), with vehicles travelling at an average speed of 80 km/h, all engines stabilized, and an ambient temperature of 10 degrees celsius, it is estimated that a 5 km length of the expressway produces some 1,600 kg/day of HC, 12,100 kg/day of CO and 1,900 kg/day of NO_x.

A comparison of the above emission rates with those projected for the Island Airport in Scenario 1 indicates that the expressway is a significantly larger source of all three pollutants, by at least a factor of 2 in the case of HC, a factor of 5 in the case of CO, and a factor of 50 for NO_x in 1992. Less favourable conditions on the expressway, e.g., more traffic at a lower speed and a lower ambient temperature, would result in even larger differences.

Other roads in the area of the airport, such as Lakeshore Road and Bathurst Street, are also major sources of air pollutants. Although these roads do not carry as much traffic as the Gardiner Expressway, vehicles generally travel at lower speeds and many of them will be operating in cold start or hot start modes, resulting in significantly higher emissions per kilometre travelled. When these and other sources in the area, e.g., railway locomotives, commercial and residential furnaces, are considered, the relative contribution of the airport is further reduced.

Emissions for the Current Trends Scenario are shown in Exhibit 8-5.

8.2.3 Road Traffic

In this scenario, the increases in airport-generated road traffic were derived by comparing the ratio of projected passenger volumes in the year 2010 to annual 1990 passenger volumes and, subsequently, applying this peak factor to the existing airport traffic destined to and from the airport during the morning and afternoon roadway peak hours. It is estimated that by the year 2010, the increased passenger activity will add a total of 108 vehicles (37 northbound and 71 southbound) on Bathurst Street south of Queen's Quay during the morning roadway peak hour, and a total of 253 vehicles (133 northbound and 120 southbound) during the afternoon roadway peak hour. More airport traffic occurs in the afternoon roadway peak hour than in the morning roadway peak hour since the roadway background traffic volumes peak during the same period of time (i.e., 5:00 to 6:00 p.m.) as the airport-generated traffic volumes. However, during the morning period, the airport-generated traffic peaks during an earlier period (i.e., 6:16 to 7:15 a.m.) than the background traffic volumes which peak between 7:30 and 8:30 a.m.

Under year 2010 conditions, the Bathurst/Lakeshore intersection will continue to operate at an acceptable of Level of Service "B" (V/C = 0.63) during the morning peak hour and at a very good Level of Service "A" (V/C = 0.47) during the afternoon peak hour. Similarly, peak hour traffic operations will remain virtually unchanged at the Bathurst/Queen's Quay intersection with Levels of Service "B" and (V/C = 0.60) and "A" (V/C = 0.57) during the morning and afternoon peak hours respectively. See Exhibit 8-6 for critical movement data.

Based on our analysis, the airport traffic is a relatively minor component of total area traffic.

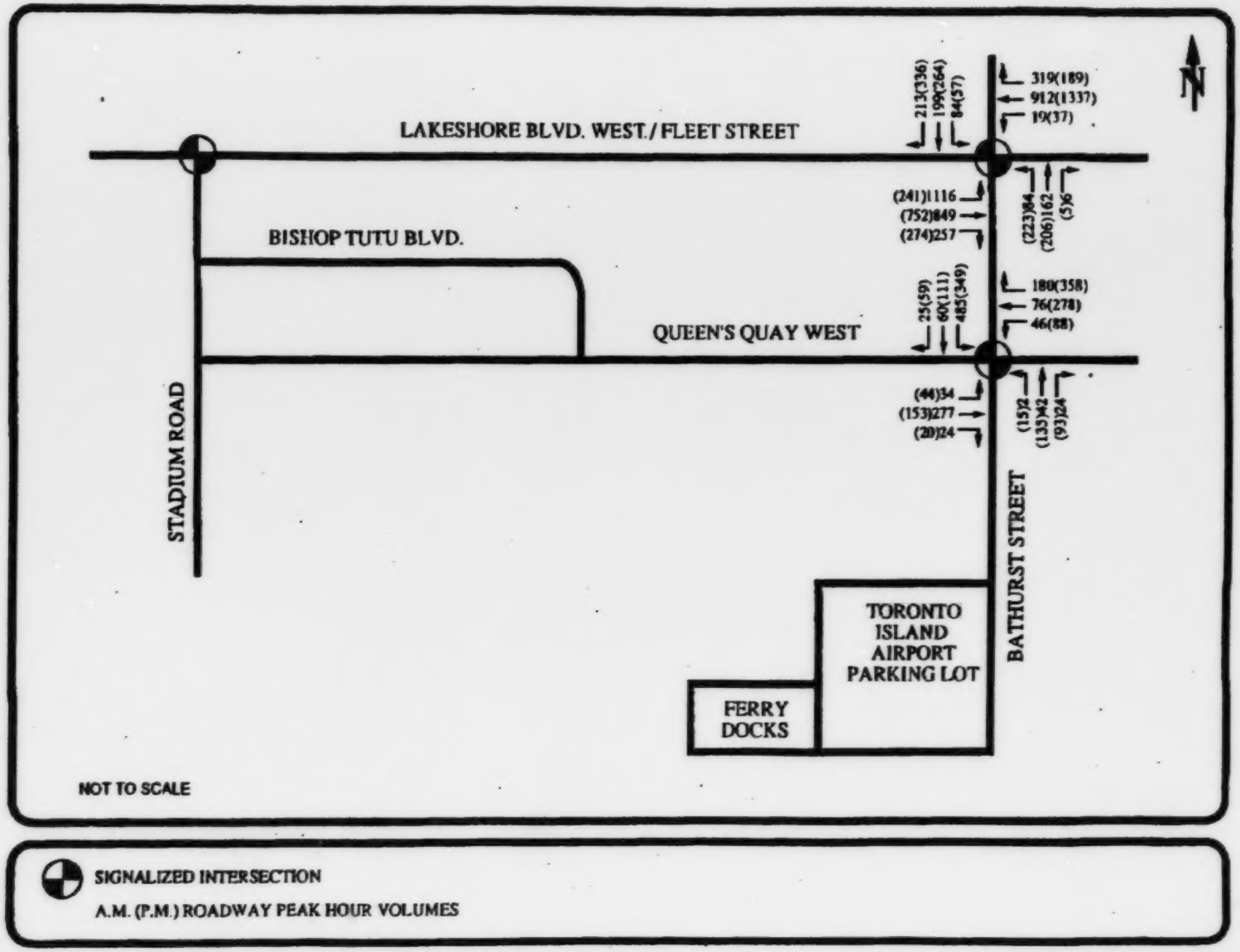
Exhibit 8-5
Scenario 1 - Current Trends

Peak Planning Day Emissions (kg/day)

	1992	1997	2002	2007
HC emissions	559	568	572	593
CO emissions	2,387	2,509	2,537	2,419
NOx emissions	33	34	35	36

Exhibit 8-6

Critical Movements
Scenario 1



Since intersection and boundary roadway operations remain essentially unchanged, no intersection or roadway improvements are necessary to accommodate the increases in airport traffic associated with Scenario 1.

8.2.4 Car Parking

Based on average weekday parking conditions, the peak parking demand will be 91 vehicles (73% of existing supply). This peak parking demand occurs at midday (12:30 p.m.). The capacity of the existing airport surface parking lot on the mainland is 124 spaces. Based upon a forecast variation in daily passenger traffic, the peak day parking demand would be approximately 1.46 times greater (i.e., 133 vehicles) than that during the average day. Currently, conditions are such that parking demand exceeds supply (i.e., full lot occupancy during peak hour) on the peak day. On those occasions when demand exceeds supply, some of the parkers apparently use other nearby parking lots (e.g., the gravel lot on Canada Malting lands).

If a 400 car parking garage were constructed, there would be sufficient parking supply to accommodate the peak daily parking demand throughout the planning horizon. In that case, it is estimated that the parking demand in year 2010 will be approximately 74 percent of the available parking supply on the peak day. If the garage is not built, then parkers will have to make significant use of other nearby parking facilities.

8.2.5 Ferry Access

The ferry survey results from July 19, 1990 indicate that over the 17 hours of the survey a total of 1,150 people used the ferry to go to the airport and 1,175 people used the ferry to come from the airport to the mainland.

The peak hour for embarking ferry (from the mainland) demand occurred from 6:15 to 7:15 a.m. while the peak hour for disembarking ferry demand (to the mainland) occurred from 5:00 to 6:00 p.m. The maximum number of passengers carried by the ferry at any one time was 44 people. This occurred twice, once at 6:15 a.m. going to the airport and again at 4:15 p.m. coming from the airport.

The current peak hour demand for ferry usage on a typical day is 145 people as noted above. This represents 29 percent of the peak hour ferry capacity of 500 passengers as calculated in Section 4.5.2. Based on the variation in daily passenger traffic, the peak hour ferry demand for the peak day condition (i.e., Friday) would be 1.46 times greater than the average day. Accordingly, it is estimated that the Friday peak hour ferry demand would represent in the order of 42 percent of passenger capacity of the ferry.

Based on current annual passenger traffic at the Island Airport, it is estimated that the existing ferry's capacity is sufficient to accommodate an annual passenger demand of up to 1.1 million commuter passengers. When the traffic volume of 1.1 million commuter passengers is exceeded a new, larger ferry will be required. The replacement of the existing ferry would also be required if there were no traffic growth, as the physical condition of the present vessel is deteriorating, requiring escalating expenditures on maintenance. Hence, in those scenarios in which the 1.1 million passenger mark is reached after the year 2000, the ferry might have to be replaced even before that level is reached.

As seen previously in Exhibit 8-1, approximately 1.04 million passengers are forecast to use the Island Airport by year 2010 in Scenario 1. Based on this annual passenger demand, it is estimated that during the peak hour on the peak weekday approximately 93 percent of the current ferry's capacity will be used. Thus, it is anticipated that there will be sufficient ferry capacity to accommodate the projected ferry passenger demand 20 years hence under Scenario 1 conditions, even if the existing ferry continues to operate, although demand will be approaching capacity.

8.3 Financial Viability

Based on the demand forecasts for the Current Trends Scenario, the Island Airport will be financially viable from the first year of our projection. The expected net operating income in the first year (1992) is $12,000. By the year 2002, the accumulated annual surplus and the accumulated capital reserve are expected to grow to $2.2 million and $7.1 million respectively.

The primary source of revenue in this scenario is the passenger user fee which is expected to account for over 50 percent of the total revenue. Total revenue from commuter traffic (passenger user fees, commuter landing fees and fuel tax) is expected to be over 80 percent of total airport revenue.

A summary of financial results is shown in Exhibit 8-7.

8.4 Conclusions

The major conclusions which flow from the analyses presented in this chapter for the Current Trends Scenario are as follows:

- The noise limits specified in the Agreement are not expected to be exceeded in this study horizon if local movements are restricted beginning in the year 2000.

Exhibit 8-7
Scenario 1—Current Trends
Financial Viability ($000s)

	1992	1997	2002	2007
Annual Cash Flows				
Revenues				
Passenger User Fees	1,606	2,513	3,906	6,070
Other User Charges	1,277	1,638	2,100	2,762
Total Revenues	2,883	4,151	6,006	8,832
Expenses				
Operating Expenses	2,439	3,185	4,175	5,523
Contribution to Reserve for Major Capital Expenditures	433	623	901	1,325
Total Expenses	2,872	3,808	5,076	6,848
Net Operating Income (Loss)	12	344	930	1,984
Transport Canada's Share of Operating Income	6	172	465	992
Accumulated Accounts				
Accumulated Surplus (Deficit)	6	506	2,200	5,994
Accumulated Capital Reserve	433	3,141	7,054	12,757

- There appears to be no evidence to suggest that emissions from operations at the Island Airport during the planning horizon will result in undesirable air quality in the airport vicinity.
- No intersection or roadway improvement are necessary to accommodate the increases in airport traffic during the planning horizon.
- The on-site parking facility is currently at capacity during the peak hour of the peak day. If a 400 car parking garage were constructed, then there would be ample parking supply for the airport during the planning horizon. If it is not, then parking demand will be accommodated in neighbouring lots.
- Even with continued use of the existing ferry during the planning horizon, there will be sufficient ferry capacity to accommodate the projected passenger demand, although demand will be approaching capacity at the end of the planning horizon.
- The Island Airport will be financially viable from the first year of the projection and throughout the entire planning horizon.

9. Commuter Scenarios

The scenarios described in this chapter were selected to provide insights into the impacts of various levels of commuter traffic. The scenarios are designed to assess what might happen if the Island Airport were marketed to commuter carriers. Separate scenarios are analyzed to assess the impacts of permitting jet aircraft to use the Island Airport. Specifically, three scenarios are reviewed:

- Scenario 2. Increased Commuter Movements (without Jet Aircraft) and Unrestricted Itinerant General Aviation.
- Scenario 3. Increased Commuter Movements (with Jet Aircraft) and Unrestricted Itinerant General Aviation.
- Scenario 4. Increased Commuter Movements (without Jet Aircraft) and Restricted General Aviation.

As explained in Section 7.1, since Scenario 2 complies with the Agreement in all forecast years without restricting itinerant General Aviation activity, Scenario 4 was found to be redundant. Consequently, no discussion of Scenario 4 is provided in this chapter. Scenarios 2 and 3 are presented below.

As in Chapter 8, the results are presented under the following topics:

- The key parameters of each scenario (including activity forecasts).
- The impacts under each scenario (i.e., noise levels, air quality, road traffic, car parking and ferry access).
- An assessment of the financial viability of the airport under each scenario.
- A summary of the key conclusions drawn from the results of the analysis described in the chapter.

9.1 Scenario 2 - Increased Commuter Movements (without Jet Aircraft) and Unrestricted Itinerant General Aviation

The key parameters of Scenario 2 are:

- The commuter service offered at the Island Airport is expanded to include all new routes which are forecast to have enough passenger traffic to justify commuter service from the Island Airport.
- The pricing strategy for services at the Island Airport (e.g., landing fees and passenger user fees) does not change materially after the increase in passenger user fees on January 1, 1991.
- No amendment is made to the Agreement to allow jet aircraft to operate from the Island Airport.

Activity forecasts for Scenario 2 are presented in Exhibits 9-1 and 9-2. As shown in Exhibit 9-1, annual enplaned and deplaned passengers are projected to be 1.4 million by the end of the planning horizon. As in Scenario 1, the number of peak day Dash 8 movements on existing routes is unchanged until after 2002. The eight additional Dash 8 movements in 2002, as shown in Exhibit 9-2, service new routes.

9.1.1 Impacts under Scenario 2

Noise Levels

With no local movements, noise contours are well within the limits specified by the Agreement to the end of the planning period (2010). All the projected local movements can be accommodated to the year 1995. Between 1996 and 2010, three quarters of the local movements would have to be gradually phased out in order to keep noise levels within specified limits.

Air Quality Impacts

In Scenario 2, there are no major increases in emissions. HC emissions and NO_X emissions increase by up to 12 percent over the emissions in the Current Trends scenario by the year 2007 due to the increases in commuter and itinerant General Aviation traffic. CO emissions actually decline by up to 6 percent by the year 2007 due to the reduction in local movements (mainly piston aircraft) which results in a decrease in total peak planning movements from 682 in the Current Trends scenario to 610 in Scenario 2.

A summary of emissions for Scenario 2 is presented in Exhibit 9-3.

Road Traffic

In Scenario 2, the Bathurst/Lakeshore and Bathurst/Queen's Quay intersections will continue to operate at the same Levels of Service as documented in Scenario 1 until the end of the planning period. As a result, no intersection or boundary roadway improvements will be necessary. Critical movements for major intersections are shown in Exhibit 9-4.

Exhibit 9-1
Scenario 2 - Commuter Growth Without Jets

Annual Enplaned/Deplaned Passengers
Toronto Island Airport

Year	Passengers (000's)
1992	607
1993	654
1994	681
1995	710
1996	741
1997	771
1998	803
1999	835
2000	869
2001	904
2002	940
2003	1,001
2004	1,064
2005	1,131
2006	1,176
2007	1,224
2008	1,273
2009	1,325
2010	1,378

Exhibit 9-2
Scenario 2 - Commuter Growth Without Jets

Peak Planning Day Movements

	1992	1997	2002	2007
Commuter				
Twin Otter	12	16	8	16
Dash 8	90	90	98	106
Total Commuter	102	106	106	122
Itinerant General Aviation				
Cessna Citation	2	3	3	3
Cessna Conquest II	29	31	33	36
Beech Baron 58P	47	50	54	58
Cessna 150, 172, etc.	187	200	215	230
Total Itinerant General Aviation	265	284	304	326
Local Movements				
Single-engine piston	278	268	208	137
Twin-engine piston	49	47	37	24
Total Local Movements	327	316	245	161
Total Movements	694	706	656	610

Note: Totals may not add due to rounding.

Exhibit 9-3
Scenario 2 - Commuter Growth Without Jets

Peak Planning Day Emissions
(kg/day)

	1992	1997	2002	2007
HC emissions	573	583	572	593
CO emissions	2,407	2,434	2,359	2,269
NOx emissions	35	37	37	40

Exhibit 9-4

Critical Movements
Scenario 2

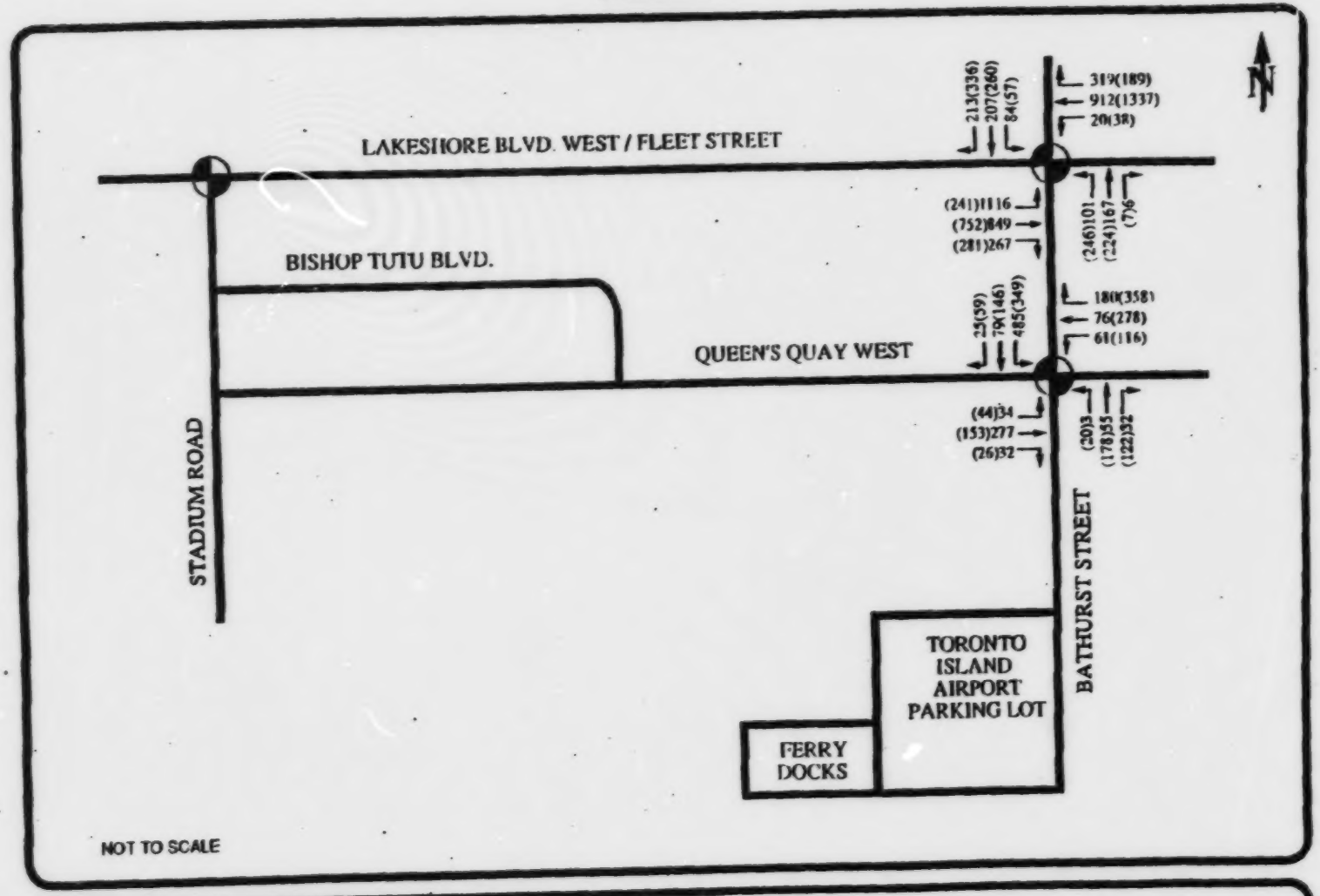


Exhibit 9-5
Scenario 2—Commuter Growth without Jets
Financial Viability ($000s)

	1992	1997	2002	2007
Annual Cash Flows				
Revenues				
Passenger User Fees	1,911	3,101	4,823	8,014
Other User Charges	1,341	1,746	2,281	3,156
Total Revenues	3,252	4,846	7,104	11,170
Expenses				
Operating Expenses	2,520	3,335	4,394	5,996
Contribution to Reserve for Major Capital Expenditures	488	727	1,066	1,675
Total Expenses	3,008	4,062	5,460	7,671
Net Operating Income (Loss)	244	785	1,645	3,499
Transport Canada's Share of Operating Income	122	392	822	1,749
Accumulated Accounts				
Accumulated Surplus (Deficit)	122	1,555	4,746	11,636
Accumulated Capital Reserve	488	3,641	8,249	15,390

Parking

Based upon the projected increases in commuter traffic, the peak parking demand can be accommodated up to the end of the planning period with the construction of a 400 car parking facility. The parking demand will be approximately 97 percent of the available parking supply at this time.

Ferry Access

Ferry capacity will be adequate to approximately 2004. After this year, the ferry will have to be replaced with a larger vessel.

9.1.2 Financial Viability

Based on the demand forecasts for Scenario 2, the Island Airport will be financially viable from the first year of the projection. The expected net operating income in the first year (1992) is $122,000. The accumulated annual surplus and the accumulated capital reserve are expected to grow to $4.7 million and $8.2 million respectively by 2002. Other key results are summarized in Exhibit 9-5.

9.2 Scenario 3 - Increased Commuter Movements (with Jet Aircraft) and Unrestricted Itinerant General Aviation

The key parameters of Scenario 3 are:

- The commuter service offered at the Island Airport is expanded to include all new routes which are determined to be viable from the Island Airport.
- The pricing strategy for services at the Island Airport (e.g., landing fees and passenger user fees) does not change materially after the increase in the passenger user fee on January 1, 1991.
- An amendment will be made to the Agreement to allow jet aircraft to operate from the Island Airport.

Activity forecasts for Scenario 3 are in Exhibits 9-6 and 9-7. In this scenario, the volume of annual enplaned and deplaned passengers is projected to grow to 1.4 million by the year 2005, as shown in Exhibit 9-6. At that time, limits imposed by the Agreement restrict the level of activity at the airport and, consequently, passenger traffic is capped at this level.

For the purpose of this analysis, we have assumed that turboprop service would be replaced with jet service on any route which reaches a certain threshold of annual traffic to

Exhibit 9-6
Scenario 3 - Commuter Growth With Jets

Annual Enplaned/Deplaned Passengers Toronto Island Airport

Year	Passengers (000's)
1992	752
1993	828
1994	863
1995	900
1996	938
1997	978
1998	1,017
1999	1,059
2000	1,102
2001	1,146
2002	1,192
2003	1,264
2004	1,338
2005	1,400
2006	1,400
2007	1,400
2008	1,400
2009	1,400
2010	1,400

Exhibit 9-7
Scenario 3 - Commuter Growth With Jets

Peak Planning Day Movements

	1992	1997	2002	2007
Commuter				
Twin Otter	12	20	12	20
Dash 8	10	10	18	14
BAe146	58	60	64	75
Total commuter	80	90	94	109
Itinerant General Aviation				
Cessna Citation	2	3	3	3
Cessna Conquest II	29	31	33	36
Beech Baron 58P	47	50	54	58
Cessna 150, 172, etc.	187	200	215	230
Total Itinerant General Aviation	265	284	304	326
Local Movements				
Single-engine piston	0	0	0	0
Twin-engine piston	0	0	0	0
Total Local Movements	0	0	0	0
Total Movements	345	374	399	435

Note: Totals may not add due to rounding.

justify a 50 seat aircraft. In effect, a Dash 7 can also carry 50 passengers. However, for illustrative purposes, all 50 seat aircraft are assumed to be jets.

9.2.1 Impacts under Scenario 3

Noise Levels

No local movements can be accommodated without violating the specified noise limits. Without local movements, noise contours are within the limits specified by the Agreement to about the year 2005, at which time jet movements are assumed to be limited to ensure that the maximum noise exposure limits are not exceeded.

Air Quality Impacts

In Scenario 3, HC and CO emissions are much lower than in the Current Trends scenario. HC emissions are approximately half the forecast level in the Current Trends scenario throughout the forecast period and CO emissions are one-half to one-third of the level of CO emissions in the Current Trends Scenario in all years. These reductions are due to the removal of all local aircraft movements and the replacement of many of the Dash 8 turboprop movements with jet movements which emit less HC and CO. However, because of the jet activity, NO_x emissions are seven to eight times the levels in the Current Trends Scenario for all years.

A summary of emissions for Scenario 3 is presented in Exhibit 9-8.

Road Traffic

In Scenario 3, projected increases in commuter traffic are capped at 1.4 million annual passengers in year 2005. Therefore, the traffic impacts due to airport-generated traffic would be identical to those documented in Scenario 2.

Parking

Based upon the projected increases in commuter traffic, the peak parking demand can be accommodated up to the end of the planning period with the construction of the 400 car parking facility. The parking demand will be approximately 99 percent of the available parking supply at this time. This parking demand will be reached by year 2005 at which time the commuter aircraft movements are expected to be capped up to the end of the planning period due to noise restrictions.

Exhibit 9-8
Scenario 3 - Commuter Growth With Jets

Peak Planning Day Emissions
(kg/day)

	1992	1997	2002	2007
HC emissions	210	228	270	279
CO emissions	1,281	1,363	1,506	1,630
NOx emissions	257	268	285	333

Exhibit 9-9
Scenario 3—Commuter Growth with Jets
Financial Viability ($000s)

	1992	1997	2002	2007
Annual Cash Flows				
Revenues				
Passenger User Fees	2,369	3,930	6,117	9,168
Other User Charges	1,604	2,152	2,920	4,127
Total Revenues	3,973	6,082	9,038	13,295
Expenses				
Operating Expenses	2,549	3,433	4,579	6,155
Contribution to Reserve for Major Capital Expenditures	596	912	1,356	1,994
Total Expenses	3,145	4,345	5,935	8,149
Net Operating Income (Loss)	828	1,737	3,103	5,146
Transport Canada's Share of Operating Income	414	869	1,551	2,573
Accumulated Accounts				
Accumulated Surplus (Deficit)	414	3,876	10,147	21,366
Accumulated Capital Reserve	596	4,531	10,354	19,215

Ferry Access

Ferry capacity will be adequate to approximately 1999. After that, the ferry will have to be replaced with a larger vessel.

9.2.2 Financial Viability

Based on the demand forecasts for Scenario 3, the Island Airport will be financially viable from the first year of our projection. The expected net operating income in the first year (1992) is $828,000. The accumulated annual surplus and the accumulated capital reserve are expected to grow to $10.1 million and $10.4 million respectively by 2002. Other key results are summarized in Exhibit 9-9.

9.3 Conclusions

The major conclusions that flow from the results of the Commuter Scenarios presented in this chapter are as follows:

- If jet aircraft are not permitted to use the Island Airport:
  - Noise contours will be well within the limits specified by the Agreement to the end of the planning period (2010) as long as local movements are phased out during the planning horizon. Otherwise, the noise limits in the Agreement will be exceeded after 1995.
  - There appears to be no evidence to suggest that emissions from operations at the Island Airport will result in undesirable air quality in the airport vicinity during the planning horizon.
  - No intersection or boundary roadway improvement will be necessary during the planning horizon.
  - The on-site parking facility is currently at capacity during the peak hour of the peak day. If a 400 car parking garage were constructed, then there would be ample parking supply for the airport during the planning horizon. If it is not, then parking demand will be accommodated in neighbouring lots.
  - Ferry capacity will be adequate with the existing ferry service to approximately the year 2004.
  - The Island Airport will be financially viable throughout the planning horizon.
- If jet aircraft are permitted to use the Island Airport:

- Noise contours will be within the limits specified by the Agreement to about the year 2005 as long as local movements are removed at the same time as the jet aircraft are permitted to use the airport. No local movements can be accommodated at the same time as jet aircraft without violating the noise constraints. Beginning in 2005, jet aircraft movements must be restricted.

- HC and CO emissions are approximately one-half of the comparable emissions in the Current Trends Scenario. However, because of the jet activity, NO_X emissions are seven-times the levels in the Current Trends Scenario for all years.

- No intersection or road improvements will be necessary.

- The surface parking lot demand will exceed the available supply by 1992 under average daily conditions. However, if a 400 car parking garage were constructed, the available supply of spaces would be sufficient throughout the planning horizon.

- Ferry capacity will be adequate with the existing ferry service to approximately 1999.

- The Island Airport will be financially viable throughout the planning horizon.

10. General Aviation Scenarios

The scenarios described in this chapter were selected to provide insights into the impacts of various levels of itinerant General Aviation traffic. In the scenarios, the services and facilities of the Island Airport are assumed to be promoted by the THC to encourage use by itinerant General Aviation aircraft. Specifically, two scenarios are reviewed:

- Scenario 5. Break-even General Aviation Scenario
- Scenario 6. Maximum General Aviation Scenario

As explained in Section 7.1, since the Island Airport was found to be financially viable at the level of General Aviation traffic forecast in Scenario 1, Scenario 5 was found to be redundant. Consequently, no discussion of Scenario 5 is provided in this chapter.

As in Chapter 8, the results are presented under the following topics:

- The key parameters of each scenario (including activity forecasts).
- The impacts under each scenario (i.e., noise levels, air quality, road traffic, car parking and ferry access).
- An assessment of the financial viability of the airport under each scenario.
- A summary of the key conclusions drawn from the results of the analysis described in the chapter.

10.1 Scenario 6 - Maximum General Aviation

The key parameters of Scenario 6 are:

- Buttonville airport is assumed to close before 1992 resulting in the doubling of itinerant General Aviation traffic at the Island Airport.
- The pricing strategy for services at the Island Airport (e.g., landing fees and passenger user fees) does not change materially after the increase in the passenger fee on January 1, 1991.
- No commuter traffic is allowed at the Island Airport.

A sensitivity analysis was conducted for this scenario in which commuter service is assumed to be offered at a level sufficient to make the Island Airport financially viable. Results of the sensitivity analysis are discussed at the end of this chapter.

Activity forecasts for Scenario 6 are presented in Exhibit 10-1.

10.2 Impacts under Scenario 6

Noise Levels

Only one-half of the projected local movements can be accommodated without violating the noise specifications in 1992. All local movements would have to be phased out completely by the year 2000.

Air Quality

In this scenario, significant reductions in emissions for all pollutants are projected. Specifically, emissions in 1992 for HC, CO and NO_X would be lower by approximately 30 percent, 19 percent and 28 percent respectively than levels projected for 1992 in the Current Trends Scenario. Emissions are lower in this scenario because the emissions from the incremental General Aviation movements are lower than the emissions of the larger commuter aircraft which are assumed to have left the airport in this scenario.

A summary of emissions for Scenario 6 is presented in Exhibit 10-2.

Road Traffic

The road traffic expected to be generated by the Island Airport would be the same as or less than (0 percent to 25 percent less) under existing conditions. Consequently, traffic operations at the boundary roadway intersections (Bathurst/Lakeshore and Bathurst/Queen's Quay) are expected to remain the same or improve under this scenario. Therefore, the volume/capacity ratios at these two intersections should not change from current morning (V/C = 0.62 and 0.58) and afternoon (V/C = 0.47 and 0.58) roadway peak hours.

Car Parking

It is expected that the parking demand over the entire planning period up to and including the horizon year 2007 will be less (ranging from 0 percent to 25 percent less) than the demand occurring today with commuter service offered at the Toronto Island Airport. If required, occasional overflow parking can be accommodated by other parking lots in the immediate vicinity of the airport. Therefore, there would be no requirement for parking lot expansion under this scenario.

Exhibit 10-1
Scenario 6 - Maximum General Aviation

Peak Planning Day Movements

	1992	1997	2002	2007
Commuter				
Dash 8	0	0	0	0
Total Commuter	0	0	0	0
Itinerant General Aviation				
Cessna Citation	5	5	5	6
Cessna Conquest II	58	62	66	71
Beech Baron 58P	93	100	107	115
Cessna 150, 172, etc.	374	401	429	460
Total Itinerant General Aviation	530	568	609	653
Local Movements				
Single-engine piston	139	75	0	0
Twin-engine piston	25	13	0	0
Total Local Movements	164	88	0	0
Total Movements	693	656	609	653

Note: Totals may not add due to rounding.

Exhibit 10-2
Scenario 6 - Maximum General Aviation

Peak Planning Day Emissions (kg/day)

	1992	1997	2002	2007
HC emissions	165	169	172	186
CO emissions	1,957	1,855	1,728	1,858
NOx emissions	24	24	25	27

Exhibit 10-3
Scenario 6 - Maximum General Aviation
Financial Viability ($000s)

	1992	1997	2002	2007
Annual Cash Flows				
Revenues				
Passenger User Fees	0	0	0	0
Other User Charges	525	678	874	1,136
Total Revenues	525	678	874	1,136
Expenses				
Operating Expenses	2,092	2,671	3,409	4,352
Contribution to Reserve for Major Capital Expenditures	0	0	0	0
Total Expenses	2,092	2,671	3,409	4,352
Net Operating Income (Loss)	(1,567)	(1,993)	(2,535)	(3,217)
Transport Canada's Share of Operating Income	0	0	0	0
Accumulated Accounts				
Accumulated Surplus (Deficit)	(1,567)	(10,603)	(22,096)	(36,692)
Accumulated Capital Reserve	0	0	0	0

Ferry Access

As with road traffic and car parking, the current ferry service is expected to be adequate for the entire forecast period if commuter service is no longer provided at the Island Airport.

10.3 Financial Viability

Based on the demand forecasts for Scenario 6, the Island Airport will not be financially viable at any time during the forecast period. The expected net operating loss in the first year (1992) is expected to be $1.6 million and to climb to $2.5 million by 2002. No contributions are expected to be made to the reserve for major capital expenditures during the study horizon.

A summary of key financial results is provided in Exhibit 10-3.

10.4 Break-Even Sensitivity

As shown above, the Island Airport cannot be financially viable if commuter traffic is removed, even if the level of itinerant General Aviation traffic is doubled. Therefore, we have estimated the minimum level of commuter traffic required to make the Island Airport financially viable (i.e., approximately 94 percent). At this level of commuter and General Aviation traffic, the noise exposure is still within the limits specified in the Agreement in the first year of the planning horizon if local movements are phased out completely.

10.5 Conclusions

The major conclusions of the results presented in this chapter are as follows:

- With no local movements, the noise limits specified in the Agreement are not violated. One-half of the projected local movements might be accommodated without violating the noise limits in 1992. Local movements would have to be phased out completely by the Year 2000 in order to comply with the Agreement.
- The emissions associated with this scenario are significantly lower than those in the Current Trends Scenario.
- No intersection or road improvements will be necessary.
- If the commuter traffic is eliminated, the existing parking facility will be adequate throughout the planning horizon. With the construction of the 400 car parking garage there will be an ample supply of parking spaces.

- The existing ferry will provide sufficient capacity to the end of the planning horizon.
- The Island Airport will not be financially viable at any time during the forecast period. The expected deficit in the first year is projected to be approximately $1.5 million.

If commuter aircraft are permitted to use the Island Airport at the same time as General Aviation activity is doubled, in order to achieve financial self-sufficiency in the first year of the planning horizon, the level of commuter traffic must be no less than 94 percent of the level in Scenario 1. At this level of traffic, local movements cannot be accommodated within the limits specified in the Agreement, and would have to be phased out completely.

Appendix A

TERMS OF REFERENCE

TORONTO ISLAND AIRPORT

APRIL 9, 1990

TERMS OF REFERENCE

Toronto Island Airport Study

Background

At its meeting held on February 19 and 20, 1990, City Council adopted recommendation 1 of Executive Committee Report 4, Clause 56, as follows:

1. That the Commissioner of Planning and Development be requested to report on specific terms of reference, including timing and cost, for a consultant study of the Toronto Island Airport, in order to provide the expert advice required to address the questions set out in this report, recognizing that funds for this purpose are not included in the 1990 Operating Budget Estimate of the Planning and Development Department and will have to be provided if the study is to proceed.

The report of the Commissioner of Planning and Development which included this recommendation explained that numerous requests for reports regarding the operation of the Island Airport had been received from Council and its Committees. In reviewing these requests, the following four key questions were identified.

1. **What is the role of the Island Airport within the regional transportation system?**

2. **To what extent do the conditions of the Tripartite Lease Agreement constrain future airport development and increases in commuter air services? What additional constraints or caps can be added to the tripartite Lease?**

3. **What are the impacts of various levels of airport development and commuter air service on the surrounding area, particularly adjacent parkland and residential communities?**

4. **What level of operation is necessary to make the Island Airport financially viable, today and in the future?**

The role of the consultant is to conduct a general study which will provide the information necessary to deal with the above questions.

PURPOSE OF THE STUDY

To provide information and an assessment of the issues involving the Island Airport as outlined by the four questions contained in the preceding section and assemble the information in order that Council may clarify its position with respect to the future of the Island Airport.

STUDY TASKS

In addressing each of the first four questions outlined above, the consultant will provide information, analysis and a clear explanation of the following.

- The role the Island Airport plays within the regional transportation system as it exists now.
- The role the Island Airport plays within the City of Toronto.
- The role the Island Airport could play in the regional transportation network if it were allowed to develop to its full market potential.
- The future trends and potential development in commuter transportation in the regional travel market including the impact of a direct transit link between Pearson and the downtown.
- The extent to which the NEF contours affect various air traffic scenarios.
- The extent to which the noise restrictions on particular types of aircraft using the Island Airport affect the operations and development of services.
- The extent to which the runways affect airport operations and development of services.
- The extent to which the existing airside and groundside facilities affect operations and development of services.
- The extent to which flightpaths can be developed and controlled to avoid conflict with residential areas.
- The realistic maximum capacity of the ferry service for air passenger use and air ambulance, all support and maintenance services.
- The effectiveness of the Island Airport Lease Agreement restrictions compared to other possible methods of control, including any which may be utilized at other similarly sized airports.
- The extent to which new technology (ie. quieter aircraft, better landing facilities) in the future can affect the restrictions currently in place through the Lease Agreement.

- The extent to which the use of parking and access for the Island Airport impact on the surrounding residential neighbourhoods and proposals for alternative solutions including the capital and annual maintenance costs of such alternatives.

- The extent to which public and employee parking may affect airport operations and development of services.

- The extent to which the introduction of improvements to public transport between Pearson and the City may affect operations and development of the Island Airport.

- The impacts of current and any proposed changes to airport operations and commuter air services on the surrounding area and on airport infrastructure.

- The break-even airport operating scenario given no annual operating subsidy, and the full annual amortization of capital costs associated with necessary improvements to facilities.

- The level of operation necessary to make the Island Airport financially viable under the existing Lease Agreement and what, if any, changes to the Lease Agreement are necessary to achieve financial viability.

The consultant is expected to outline any other tasks that may be useful to the purpose of this study.

The consultant will be required to be aware of previous studies and reports, including any reports to City Council leading up to the Lease Agreement, concerning the Island Airport and make reference to their conclusions as necessary for this study. It is not required that a summary of each report be prepared, however, a list of all studies considered or reviewed by the consultant must be included in his report.

To assist in achieving the study objective, the consultant will also undertake the following general tasks:

- Forecast the potential passenger volume for the Island Airport to the year 2011 under alternative scenarios.

- Consult with appropriate regulatory agencies, the airport operator, scheduled air carriers and general aviation users of the Island Airport, local citizens and residents.

- Conduct a survey of present users of the Island Airport in order to determine general characteristics of such patrons.

. Consult with the City Solicitor where interpretation of the provisions of the Lease Agreement is involved.

. Presentation to members of Council at the conclusion of the study.

SUBMISSION REQUIREMENTS FOR PROPOSAL

Four copies of the proposal are due by 4:00 p.m. on Friday, April 27, 1990. It should include the following:

. Letter stating interests

. Summary of workplan

. Detailed methodology

. Outline showing consultant's understanding of issues pertaining to methodology

. Detailed workplan, timeline and costs

. Description of project team, including resumes and division of responsibilities and identification of prime consultant

. Outline of firm's experience, including description of relevant or comparable studies completed by the firm and the names of three references

SELECTION CRITERIA AND PROCESS

All proposals submitted by the deadline will be reviewed and a short list of consultants will be invited for an interview. The consultants will be evaluated on the basis of the following criteria:

- Understanding of the assignment and potential problems

- Quality and appropriateness of the proposed approach, workplan, and budget allocation, including any valuable suggestions made

- Qualifications and relevant experience of the consultant team assigned to the project

- Experience of the firm in similar studies and demonstrated ability to handle the project

Emphasis will be placed on the qualifications and experience of the consultant team.

Each short-listed team will be required to attend a 45 minute interview with the City to:

- introduce the team members and explain the experience and role of each
- review your relevant experience
- outline your approach to the project

The successful consultant will be required to meet the City of Toronto's Contract Compliance requirements by filing equal opportunity forms on their workforce.

STUDY TIMELINE

The study is expected to be completed within 5 months of the starting date.

STUDY BUDGET

The price of this study is not to exceed $100,000; including all expenses.

PROJECT CONTROL

Day-to-day guidance will be provided by Joseph D'Abramo, Senior Planner, John Mende, Senior Transportation Planner and Maldwyn Williams, (Acting) Manager of the Waterfront and Railway Lands Section of the Planning and Development Department. The consultant will attend one initial meeting to review and finalize the proposed study design and a final review meeting with staff prior to the preparation of the final report. The need and number of progress meetings will be determined at the initial meeting.

REPORTING REQUIREMENTS

The consultant will deliver ten bound copies of the draft report and 35 bound copies of the final report plus an unbound master. The consultant will be required to make a presentation of the study results to appropriate City staff.

OWNERSHIP OF MATERIALS

Rights to the use of all information and materials collected and submitted will rest solely with the City of Toronto.

FINAL APPROVAL AND HIRING PROCESS

This study was originally requested by City Council at their meeting of February 19 and 20, 1990. Once a consultant has been selected, a brief report will be submitted to City Council for their final approval of the study.

TRANSMITTAL INSTRUCTIONS

Four copies of all submissions should be addressed to:

Mr. Maldwyn Williams
Acting Manager
Waterfront and Railway Lands Section
Planning and Development Department
19th Floor, East Tower
City Hall
Toronto, Ontario
M5H 2N2

Appendix B

Literature Review

Appendix B

Literature Review

Access and Movement, Report of the Access and Movement Work Group to the Royal Commission on the Future of the Toronto Waterfront, 1989.

An Issue Paper Pertaining to the Review of Alternatives to Resolve Air Traffic Congestion in the Toronto Area, Lura Group Environmental Management Strategists, December 1989.

Aviation in Southern Ontario: A Strategy for the Future, Transport Canada, January 1990.

Interim Report, Royal Commission on the Future of the Toronto Waterfront, August, 1989.

Land Use in the Vicinity of Airport, Seventh Edition, Air Navigation System Directorate, Transport Canada, March 1989.

Position Paper on Toronto Island Airport, The Board of Trade of Metropolitan Toronto, April 16, 1990.

Proposed Recommendations to Address Airport Operations for Consideration by the Heads of Council, The Greater Toronto Area Airport Study Committee, September 1990.

Response to the Interim Report: The Royal Commission on the Future of the Toronto Waterfront, The Board of Trade of Metropolitan Toronto, November 16, 1989.

Study of the Impact of Airline and General Aviation Traffic on Ferry Capacity, Hatch Associates Ltd. and Transmode Consultants Inc., June 19, 1989.

Submission on Air Transportation Needs for Southern Ontario, The Board of Trade of Metropolitan Toronto, November, 1990.

Submission to the Royal Commission on the Future of the Toronto Island Airport, The City of Toronto, Mayor Arthur C. Eggleton, February 8, 1989.

Submission to the Royal Commission on the Toronto Waterfront, Airports Authority and Aviation Group, Transport Canada, January, 1989.

Submissions to the Royal Commission on the Future of the Toronto Waterfront, Metropolitan Toronto Police Emergency Planning, June 1989.

Submissions to the Royal Commission on the Future of the Toronto Waterfront, Ministry of Health, Air Ambulance Program, June, 1989.

Technique for Developing Noise Exposure Forecasts, Society of Automotive Engineers, Incorporated, New York, New York, 1967.

The Future of the Toronto Island Airport and Related Transportation Services to the Airport, The Board of Trade of Metropolitan Toronto, December 14, 1988.

"The Future of the Toronto Island Airport: The Issues". A Report by the Staff of the Royal Commission on the Toronto Waterfront, Royal Commission on the Future of the Toronto Waterfront, Commissioner, The Honourable David Crombie, May 1989.

Toronto Island Airport 1987 Actual Noise Exposure Forecast: Input Data Report, Air Navigation Planning, Transport Canada, May 1988.

Toronto Island Airport Passenger Terminal Building, F.J. Reinders and Associates Canada Limited, February 3, 1989.

Toronto Island Airport, Access Overview, Hatch Associates and Transmode Consultants Inc., March 1988.

Toronto Island Airport, Economic Impact Study, Acres International Limited, September 1988.

Tripartite Lease Agreement, Transport Canada, June 30, 1983.

Appendix C

List of Interviewees

Appendix C

List of Interviewees

Toronto Harbour Commissioners

Ian Brown
General Manager
Toronto Harbour Commissioners

Carol Moore
Controller
Toronto Harbour Commissioners

Alex Home
Airport Manager
Toronto Island Airport

Brian Turner
Director of Works
Toronto Harbour Commissioners

Transport Canada

Ron Binnie
Regional Director General
Airports Authority Group
Transport Canada

Art Phelps
Director of Operations
Transport Canada

Ron Coulas
Regional Director of Air Navigation
Transport Canada

Mel Cooper
Manager, Toronto Island Control Tower
Toronto Island Airport

René Vienneau
Manager, Community Airports
Transport Canada

Ed Warrick
Project General Manager
Terminal 3
Transport Canada

Air Carriers

Victor Pappalardo
General Manager
City Express

Don Pengelly
Public Relations Manager
City Express

Scott Tapson
Director, Marketing
Air Ontario

Gilles Tremblay
Vice President Customer Service
Intair

Ministry of Transportation of Ontario

Joe Gleason
Manager, Aviation Office
Ministry of Transportation of Ontario

Julius Gorys
Toronto Area Coordinating Committee
Municipal Transportation Policy Planning
Ministry of Transportation of Ontario

Toronto Historical Board

Scott James
Executive Director
Toronto Historical Board

Bill Greer
Chief Architect
Toronto Historical Board

Resident Groups and Associations

Jacqueline Courval
Friends of the Spit

Ken Dobb
Chairman
Waterfront Coalition and the St. Lawrence Neighbourhood

Mary Hay
Vice Chairman
Waterfront Coalition and Island Committee

Carolyn Lemon
Vice Principal
Island Natural Science and Public School

Bill Phillips
Secretary/Treasurer
Harbourfront Residents' Association

Karey Shinn
President
Kew Beach Residents' Association

Julian Smith
Director
Harbour Square Residents and Ratepayers' Association

Gordon Woodmansey and Judy Patterson
Transport 2000

Others

Dave Allen
Regional Director of Airline Sales/Canada
British Aerospace

Wayne Barrett
Flight 32
Canadian Owners and Pilots Association

Hank Brown
Air Ambulance
Emergency Health Services
Ministry of Health

George Fairfield
Secretary
Toronto Ornithological Club

John Grafby
Sales Manager
Lear Jet Canada

Brian Holmes
General Manager
Central Airways/Avitat

James Murphy
Assistant Manager
The Board of Trade of Metropolitan Toronto

Sergeant Walker
Emergency Measures Planning
Metro Toronto Police

Appendix D

Survey of Other Airports

Appendix D

Survey of Other Airports

As part of the study, we were asked to investigate whether other airports had found superior methods for controlling noise levels to the noise exposure forecast used at the Island Airport. This exercise was carried out by surveying 8 airports in North America. The airports surveyed were selected on the basis of their proximity to the city centre (and especially to residential developments), and the level and mix of activity at the airport. Representatives from the following airports were interviewed:

- Boundary Bay, Vancouver
- St. Hubert, Montreal
- St. Andrews, Winnipeg
- Springbank, Calgary
- Edmonton Municipal, Edmonton
- Meigs Airfield, Chicago
- Burke Lakefront, Cleveland
- John Wayne, Orange County, California

Each interviewee was asked questions about the following:

- The size of the airport in terms of annual movements and annual passenger traffic
- The residents' reaction to the airport
- The types of restrictions to operations used to control noise
- The method of enforcement of noise restrictions

In this appendix, we present a brief summary of our findings by airport.

Boundary Bay, Vancouver

Boundary Bay Airport is situated approximately 2.5 miles from downtown Vancouver. It was originally a World War II airport which reopened in 1982.

Boundary Bay has approximately 220,000 movements per year, but has no scheduled air carriers. However, airport management currently has five applications from airlines which would like to provide scheduled service out of the airport at the time of this survey, it was expected that the applications would be approved.

The airport receives very few noise complaints from the nearby residents. Complaints are concentrated in the summer when people are outdoors more often.

While there are limits on neither the peak hour or peak day movements, nor on the hours of operation, the airport does have a few restrictions to their operations:

- The airport has a maximum weight restriction of 5,670 kgs.
- Only propeller aircraft are allowed.
- Runways are too short to allow the safe operation of jets.

Currently, Boundary Bay Airport does have official flight paths that are generally adhered to by aircraft flying into and out of the airport, but has no real enforcement mechanism. However the flight paths currently in place were established to avoid bird areas, not necessarily the residential areas. Boundary Bay does have a community committee to ensure it is sensitive to noise issues.

The airport does not use official noise contour to manage noise exposure because noise complaints are not really an issue at this airport.

St. Hubert, Montreal

St. Hubert Airport is located three miles from the City of St. Hubert and was the first civil airport in Canada. Annual movements have varied over the past few years. In a recent boom year there were approximately 300,000 movements; the majority of those movements being training flights. The airport has one schedule carrier, Intair, which began service to Toronto in 1989. The approximate number of scheduled passengers per month is 2,000 to 3,000.

The airport is surrounded by a large prime agricultural area that acts as a noise buffer for the airport. This agricultural area is surrounded by residential developments. Complaints from residents depend on the season with summer being the busier time for complaints.

St. Hubert does not have any real restrictions to traffic other than noise contours (NEFs). The airport has no movement caps or restrictions on hours of operation.

The real limit at St. Hubert is the runway capacity. There are currently two parallel runways at the airport. The shorter runway has a 5,000 lb limit which limits its use to single engine aircraft, while the longer runway has no limit in terms of weight. There are currently no scheduled passenger jets using the airport, but there are between 10 and 15 General Aviation jet movements per month. The airport manager feels that jets could operate out of the airport without bothering area residents.

Flight paths into and out of the airport are over the prime agricultural land (for both runways). However, training flights (which are more common in the summer) do fly over the residential areas.

St. Andrews, Winnipeg

Total annual movements vary from year to year at St. Andrews. In 1988, total movements were 115,000 and in 1989 there were 141,000 movements. The airport currently has no scheduled air carriers. The largest aircraft using the airport is a Twin Otter.

Noise complaints from nearby residents are a problem. However, most of the noise complaints concern flight training aircraft which are practicing aerobatic maneuvers. Airport management has monitored the noise levels of these flight training areas and have found that motorcycles in the area generate more noise than the aircraft.

St. Andrews Airport has no noise restrictions or movement caps. The only real restriction to growth is runway capacity.

Springbank, Calgary

Springbank is located approximately 8 miles from Calgary. Annual aircraft movements are approximately 150,000 movements. Springbank is primarily used as a training airport and no scheduled air carriers operate there.

The land around the airport is mostly acreage holdings. Noise complaints are not an issue at the airport. Springbank has no official restrictions to growth. There are no movement caps or maximum noise contours. The aircraft which use Springbank are generally propeller aircraft up to a maximum weight of 5,670 kgs, with the occasional de Havilland Dash 7 or Dash 8 at the discretion of the airport manager.

There are no restrictions on flight paths into or out of the airport.

Edmonton Municipal Airport

Edmonton Municipal Airport is located 5 minutes from Edmonton's downtown core and is completely surrounded by residences and commercial developments. Approximately 36,000 people live in the immediate vicinity of the airport. A school is located adjacent to the airport and a hospital is located under one approach path.

Three airlines currently provide service for over one million scheduled passengers per year. Annual aircraft movements are approximately 140,000.

Between 1976 and 1984, noise complaints were so numerous that the airport was almost closed. Since then, Edmonton Municipal has implemented what they see as the most comprehensive noise management program in the country. As a result of this program, noise complaints have been reduced significantly and airport management hopes to eliminate all noise complaints by the year 2001. Edmonton Municipal currently uses a form of NEF contours called the Ldn System. (See Appendix G for a description of alternatives to the NEF methodology).

Edmonton Municipal has a number of "rules" by which all aircraft operating at the airport must abide. For example, there are restrictions on night time activity, the total number of weekly number of jet aircraft is limited, and all scheduled air carrier movements must be approved by airport management.

Flight paths into and out of the airport are strictly enforced. The penalties for non-compliance at the airport range from a simple warning to a maximum fine of $25,000.

Meigs Airfield, Chicago

Meigs Airfield is a small airport located in downtown Chicago. Meigs is one of three airports in the Chicago area and acts as a reliever airport to Midway Airport. Meigs Airfield has approximately 75,000 annual movements. No scheduled air carriers operate from the airport at this time.

The closest residential area to the airport is approximately 3 miles to the north. Airport management receives only 5 to 6 complaints per year regarding noise.

A major problem at Meigs Airfield is birds. Since the airport is on the lakefront, there are many birds in the area. The airport uses guns to control them in the immediate vicinity of the airport. Environmentalists have tried occasionally to close the airport and develop parkland on the site. Their efforts have been unsuccessful, but they have managed to limit the expansion of the airport.

Meigs Airfield currently has no movement caps, no maximum noise limits and no ban on jet aircraft. The airport is open from 6:00 a.m. to 10:00 p.m. The only limiting factor at Meigs Airfield is the runway length of 4,000 feet. This runway is the same length as the

runway at the Island Airport and restricts the use of the airport to large turbo prop aircraft and some business jets.

Burke Lakefront, Cleveland

Burke Lakefront is on an island in downtown Cleveland. The airport currently has 93,000 movements per year and handles 200,000 scheduled passengers per year.

There is no residential area immediately surrounding the airport. Airport management does not receive noise complaints from residents.

There are currently no restrictions on operations at the airport. The major problems at Burke Lakefront are the presence of birds and high skyscrapers. The runway is 6,000 feet long which restricts its use by some larger aircraft.

John Wayne, Orange County, California

John Wayne Airport is located in Orange County, California and handles approximately 530,000 annual aircraft movements. Total scheduled passenger traffic in 1990 was about 5 million.

John Wayne Airport is surrounded to the north by an industrial area, to the north and south by a freeway, to the south by residences, and to the east by hotels and restaurants. Airport management receives complaints in great numbers from all areas surrounding the airport, not just the residential area.

There are many restrictions to operations at the airport.

- The airport only allows three categories of Stage III aircraft (new generation "quiet" aircraft) at the airport:
  - Class A (which include MD 82's, MD 83's, MD 87's, Boeing 757's, Boeing 737-300's).
  - Class AA (Class AA has the same type of aircraft as Class A, but additional aircraft may fall into this Class when using different departing techniques or carrying more passengers and fuel, resulting in greater noise impacts on takeoff. The BAe146 may also fall into this category).
  - Class E (BAe146s).
- In terms of movement caps for commercial air carriers, the airport limits the aircraft categories as follows:

- Class A - 39 departures per day
- Class AA - 34 departures per day
- Class E - departures depend on number of passengers served in Classes A and AA.

Note: The number of departures are calculated on an annual average.

- The airport has no noise contour based on decibel limits. It uses a logarithmic average of a single event per quarter.

Enforcement of noise restrictions at the airport is accomplished through restrictions on the types of aircraft allowed at the airport. The Airport has one runway and all arrivals come in from the north, while all departures take-off to the south. Only under certain wind conditions do aircraft depart to the north (which is only about 5% of the time).

Appendix E

Glossary of Terms

The definitions in this glossary are intended to provide the reader with a quick reference for technical terms and for terms which have been given definitions specific to this report. The definitions not intended to be official definitions.

Air Traffic Control (ATC)

Air Traffic Control is the activity in which, through radio communication with the pilots, Air Traffic Controllers oversee the movement of Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) aircraft in controlled airspace.

Apron

That part of an airport, other than the maneuvering area, intended to accommodate the loading and unloading of passengers and cargo, the refuelling, servicing, maintenance, and parking of aircraft, and any movement of aircraft, vehicles, and pedestrians necessary for such purposes.

Commuter Service

For the purposes of classifying traffic at the Island Airport, commuter traffic is defined as the movements of all aircraft for the purpose of scheduled passenger transport. Since the de Havilland Dash 8 aircraft actually operates as a General Aviation aircraft under the terms of the Agreement and not as a STOL aircraft (see Section 3.3.2), but offers scheduled passenger transport, this definition is not entirely consistent with that in the Agreement.

Enplaned and Deplaned Passengers

Enplaned and deplaned passengers includes travellers who begin or end their journey at the reporting airport or connect with a flight to another airport through the reporting airport.

Financial Viability

For the purpose of this report, the Island Airport is considered financially viable if it generates sufficient cash flow to meet annual operating obligations and to provide a

Appendix E

Glossary of Terms

reserve for future repairs and major capital expenditures required to maintain the existing capital assets over the long term.

Fixed Base Operator (FBO)

An FBO is a company that provides a range of services to the aviation community including the parking, fuelling and servicing of aircraft, hangar space and sometimes maintenance of aircraft, and a range of services and facilities to pilots and passengers such as ground transportation, communications facilities, lounges, meeting rooms, catering facilities and various flight planning facilities. A FBO may also operate aircraft for charter purposes or under contract to other corporations.

Flight Path

In the context of this report, a flight path is the path traced over the ground which an aircraft takes on departure or arrival at an airport.

General Aviation

For the purposes of this report, General Aviation includes all training flights, recreational flying, medevac flights, corporate flights, charter flights and aircraft involved in the Canadian National Exhibition airshow.

Gross Take-Off Weight

The gross take-off weight of an aircraft is the maximum allowable weight for which the aircraft is licensed to operate, including the aircraft's own weight, fuel and payload.

IFR/VFR

An aircraft can operate under Visual Flight Rules (VFR), or Instrument Flight Rules (IFR). VFR means the pilot must maintain visual contact with the ground and ensure visual separation from other aircraft. Under VFR flight, there are no explicit separation standards other than the pilot's responsibility to maintain a certain distance above the ground and from clouds. IFR, on the other hand, means that the pilot relies on electronic aids (instruments) to navigate. IFR flight is necessary when weather conditions are such that visual separation cannot be maintained (e.g., when flying within clouds or heavy fog). Air traffic controllers provide separation between IFR aircraft based on time, distance and altitude separation standards.

Instrument Approach

An instrument approach is a procedure that allows a pilot to establish the aircraft's position on final approach in weather conditions that do not permit the pilot to establish this position visually.

Itinerant General Aviation Traffic

In this report, the term itinerant General Aviation Traffic is used to refer to all itinerant movements excluding the movements of commuter aircraft. By definition, this does not include local movements (i.e., flying school activity). In the Exhibits which show historical data, itinerant General Aviation traffic is approximated by using itinerant movements by all weight groups below 9,000 kg in order to exclude the weight categories for Dash 7 and Dash 8 aircraft.

Itinerant Movements

A landing or take-off by an aircraft which arrives from or departs to another airport.

Jet Aircraft

Jet aircraft have turbine engines which compress air and force it to leave the rear of the engine at great velocity, thus providing the thrust required for the aircraft to fly. Jet engines are used today in some commuter aircraft and most larger air carrier aircraft, as well as in some types of corporate aircraft. Jet aircraft are generally noisier than piston or turboprop aircraft, although the new generation of quiet jet engines may actually produce less noise.

Local Movement

A landing take-off or simulated approach by an aircraft which does not leave the immediate vicinity of the airport. These movements are generally training flights.

Microwave Landing System (MLS)

A microwave landing system (MLS) is an electronic approach aid which enables an aircraft to land more safely in adverse weather conditions than with less sophisticated approach aids. Specialized on-board equipment is required before an aircraft can use the MLS.

Movement

A take-off, landing or simulated approach by an aircraft.

Noise Exposure Forecast Contour (NEF Contour)

Noise Exposure Forecasts (NEFs) are a means of measuring the impact of aircraft noise in the vicinity of an airport. Forecasts of noise impacts are based on the theory that the "irritation" caused to those within earshot of one aircraft movement varies with the size of an aircraft and the time of day at which the aircraft is operating from the airport. The NEF is a measure of the daily cumulative effect of all aircraft movements averaged over a defined period of time. The forecasts make use of mapped contours, that delineate the geographical boundaries of areas affected

by noise. The noise impact associated with a particular contour is specified by a rating scale. The rating scale is based on sociological surveys conducted in the vicinity of airports. The scale links a forecast noise contour with an expected reaction of people residing or working within the boundaries of the contour.

Passenger User Fee

A passenger user fee is a charge made to commercial air carriers for each passenger carried on the airline.

Peak Planning Day

The peak planning day is the average of seven busiest days of the three busiest months of a given year. This level of activity is equivalent to the 95th percentile of activity.

Piston Aircraft

A piston aircraft has a piston engine or engines, much like the engine in an automobile, which cause a propeller or propellers to rotate, providing thrust for the aircraft. Piston engines are generally used in smaller aircraft and are generally quieter than the engines in larger aircraft. These aircraft are mostly used for recreational flying, for flight training, and for a variety of commercial purposes (e.g., air taxis).

STOL Aircraft

Short Take-Off and Landing (STOL) aircraft means any fixed wing aircraft other than jet powered aircraft capable of maintaining a 6 degree glide path on descent and a 6 degree climb profile on departure, and with electronic navigational equipment to permit approach and departure in accordance with specified air traffic control procedures.

Tripartite Lease Agreement (Agreement)

The Lease Agreement dated June 30, 1983 between the Corporation of the City of Toronto, the Toronto Harbour Commissioners; and Her Majesty the Queen. This Agreement covers the lease of certain lands to the THC for 50 years (June 30, 1983 to June 30, 2033). The Agreement imposes certain restrictions on the use of the Island Airport and sets out the obligations of the three signing parties. In broad terms, the Agreement permits the use of the Island Airport for General Aviation and limited STOL passenger service.

Toronto Region

In this report, the Toronto Region is defined as the area from Hamilton in the west, to Newmarket in the north and Oshawa in the east. This area roughly corresponds to the population centre generally referred to as the Greater Toronto Area.

Toronto Area Airports

The Toronto Area Airports, as defined in this report, include Lester B. Pearson International Airport, Buttonville Airport, Oshawa Airport, Hamilton Airport and the Island Airport.

Turboprop Aircraft

A turboprop aircraft has a turbine engine which rotates a propeller, thus providing thrust for the aircraft. Aircraft with turboprop engines are generally larger and faster than the piston aircraft and therefore require the greater power provided by turboprop engines. Turboprop aircraft are generally (but not always) noisier than piston aircraft and are often used as commuter air carriers or corporate aircraft.

Appendix F

Comments From Residents' and Similar Organizations

Appendix F

Comments From Residents' and Similar Organizations

This appendix documents comments about the use of NEF contours to control activity at the Island Airport. The criticisms are organized under the following topics:

- Actual versus Theoretical Noise Exposure
- Noise Levels and Calculation Rules
- Criticisms of the NEF methodology.

Actual vs Theoretical Noise Exposure

As with any mathematical model that simulates real conditions, the NEF contour methodology employs assumptions that may not exactly match the actual situation. The reasons for the differences are violations of flight rules and other types of occurrences no: included in th○ simulations. For example:

- All aircraft are assumed to use the approved flight paths for take-offs and landings. If aircraft "cut corners" coming in for an approach and fly closer to a residential area in doing so, the impact of this action will not be captured in the NEF contour.
- All movements are assumed to be made in good weather conditions. The actual weather conditions can significantly affect the noise exposure as follows:
  - If the weather is poor, aircraft may descend on a shallower slope; thereby affecting a greater area.
  - On windy days, sound can be carried for longer distances. If there is a strong wind out of the south, the noise exposure on the south shore of the mainland is much greater than when there is no wind.
  - Low clouds tend to cause sound waves to travel further than on clear days, resulting in higher noise exposure in surrounding areas.
  - In very cold weather, sound travels further, again resulting in a larger area being affected.

- The only airport-related noise considered by the NEF is that from aircraft movements. Residents pointed out that the impact from non-movement-related noise is also irritating. For example, the NEF contour does not reflect the noise of engine run-ups performed for maintenance at night. Further, the ferry whistle is sounded each time the ferry crosses the gap. This noise is not reflected in the NEF contour either.

Noise Levels and Calculation Rules

The official NEF levels and rules of calculation, as established in the Agreement have been criticized as inappropriate for the following reasons:

- All aircraft are assumed to depart from one of the runways. A number of seaplanes use the Island Airport in the summer. The landing area for seaplanes is slightly closer to the residences on the mainland, resulting in a higher noise impact from seaplanes than from comparable aircraft using the runways. Seaplanes also use more power at take-off than if they were using a runway. The agreement specifies that noise impacts from seaplanes are included in the forecast only if there are more than 30 per day during the study period or if the actual 28 NEF contour is closer to the official 25 NEF contour than to the official 28 NEF contour for 1990.
- Helicopter noise is understated. The Agreement specifies that helicopter movements are included in the actual NEF calculation only if the annual helicopter movements exceed 4,000 or annual heavy helicopter movements exceed 500. Helicopters produce considerable noise, but they are not generally included in the actual NEF contours for the Island Airport.
- The noise contours defined as standards in 1983 pre-date the residential developments along the south shore of the mainland (e.g., Bathurst Quay). Given the increased residential development near the airport, residents believe that the maximum noise levels should be reduced.

Criticisms of the NEF Methodology

The third group of criticism relates to the appropriateness of the NEF measurement methodology itself. These are some of the objections to the measures:

- All noise impacts consider noise levels in decibels only. No adjustment is made for differences in the type of noise; it has been suggested that many find the "whine" of a jet engine far more irritating than the "whirr" of a turboprop engine, regardless of the relative noise level.

- The noise impact of all aircraft movements that occur after 10:00 p.m. is multiplied by a factor of 16 to reflect the greater irritation experienced in the late evening. However, an aircraft movement that occurs at 9:55 p.m., for example, is not subject to this weighting. It can be argued that this aspect of the calculation of NEF's significantly oversimplifies the actual irritation experienced.

- Weekend movements are assumed to create the same impact as weekday, daytime movements. Weekend "irritation" may be higher since residents may be at home (rather than at the office) and local recreational facilities are generally more heavily used on weekends.

- The model calculates the cumulative effect of all movements at the airport, but it does not take into account a "single-event" exposure when a particularly noisy aircraft uses the Island Airport.

- Many airports that use NEF contours as a measure of noise impacts are in areas where residential development and schools are much further from the runways than at the Island Airport. For example, the Island Public and Natural Science School is a mere 500 feet from the end of one runway which is used for about 5 percent of total movements. This unique situation is not adequately reflected in the noise exposure forecasts.

- Noise exposure forecasts by definition measure only the cumulative noise impact of aircraft movements. Many residents suggested that the presence of an aircraft in certain areas or at certain times of the day is offensive regardless of the level of noise. This reaction suggests that the resistance of some residents to the further development of the airport cannot be overcome by changing the NEF contours.

Appendix G

Alternatives to the NEF Contour Methodology

Appendix G

Alternatives to the NEF Contour Methodology

This Appendix describes a number of alternatives to the NEF contour methodology. The issue of appropriate noise measures is widely debated at airports all over the world, including Pearson. A publication of the U.S. Federal Aviation Administration, entitled, "*Aviation Noise Effects*" (1985) lists a host of alternative measurement methods for noise exposure. They are grouped into four categories:

- Single Event maximum sound levels.
- Single Event energy dose.
- Cumulative energy metrics.
- Cumulative time metrics.

Single Event metrics are used in standards that specify the number of individual noise occurrences that exceed a certain threshold during a day. As opposed to the cumulative measure of noise exposure used in the NEF methodology, which includes all noise, the Single Event measures ignore low-level noise. In the first of the listed groups, the most comprehensive is the PNLT (Tone-Corrected Perceived Noise Level) measure, which attaches higher weights to the more annoying higher frequency noise components. Examples in the second group of measures (Single Event energy dose) are the EPNL (Effective Perceived Noise Level) and SEL (Sound Exposure Level) measures which add the dimension of duration to the measures in the first group.

The NEF method belongs to the third group of measures. It can be regarded as a further development of the single event EPNL measure, as it accumulates the impacts of the single events measured during the day and during the night, assigning the equivalent of 16 aircraft movements to each movement occurring between 10:00 p.m. and 7:00 a.m.

Other measures in that group are the Ldn (Day-Night Sound Level) and CNEL (Community Noise Equivalent Level) measures. The first of those, similar to the NEF, is considered to be the most workable tool for community noise measurement by the FAA. The FAA has stated that unless future research can provide a reasonable alternative, the Ldn, with its appropriated 10 decibel penalty for night-time hours, should continue to be regarded the most workable measure. The CNEL differs in the application of night-time penalty: it applies a three-fold (rather than ten-fold) penalty to the time between 10:00 p.m. and 7:00 a.m.

The last group of measures includes the TA (Twenty-Four Hour Time Above) measure. It is expressed in minutes and defines the time during which the noise level exceeds a threshold.